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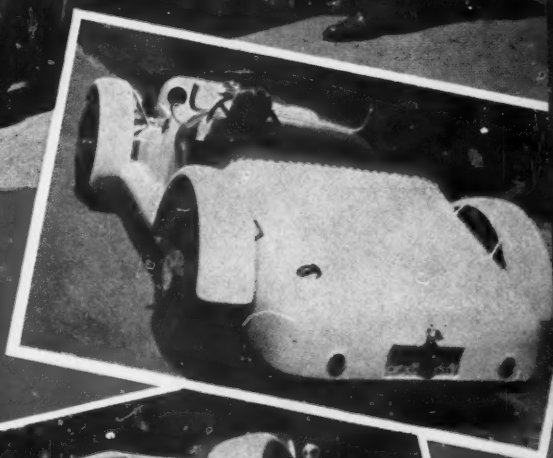

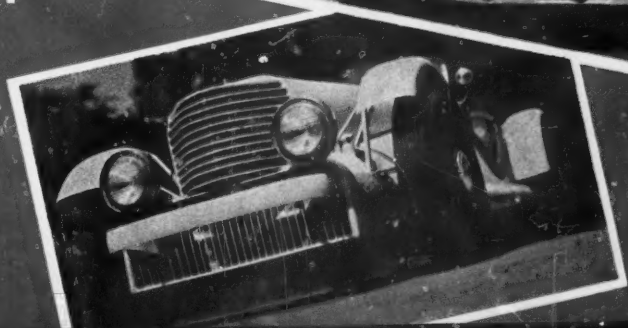

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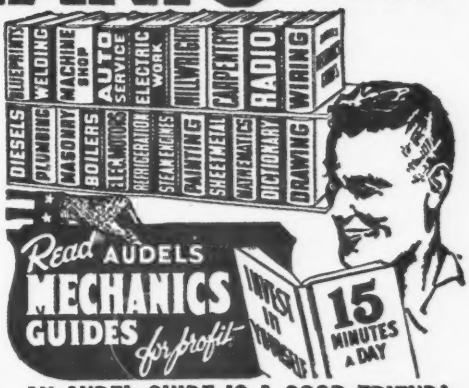

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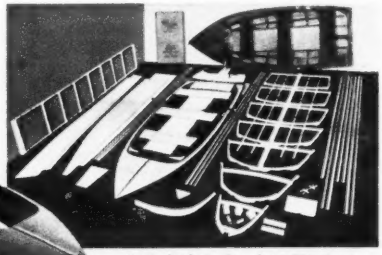

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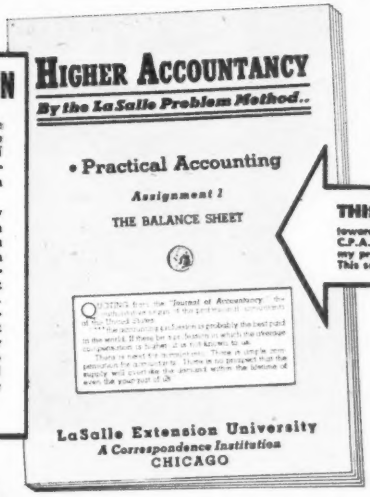

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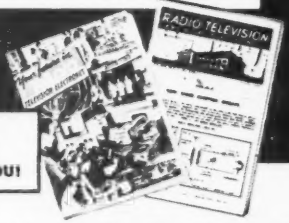

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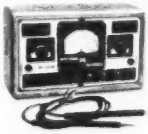

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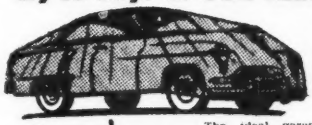

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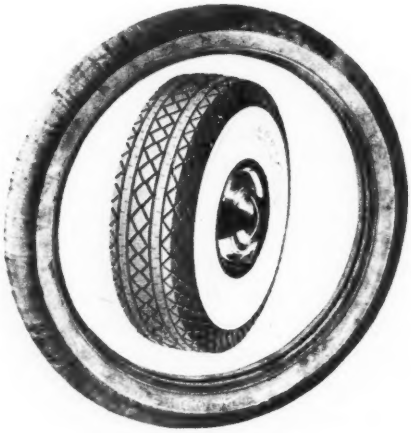
Building A Better Tire

SAFETY rims, safety tubes and tubeless tires seem to be the answers which modern industry offers to the puncture and blow-out problem of the automobile and airplane tire. Yet these are not satisfactory. They are merely designed to aid in keeping the car under control in event of tire failure.

Demonstrations by test drivers, usually working on good, level roads, can prove that rims and tires do everything the manufacturers claim for them. However, cars similarly equipped do not always fare as well when they are driven by less skilled operators who can control neither the split second when a puncture or blow-out will occur, nor specify that it will not happen when rounding a hairpin turn on a mountain road.

So, the conclusion must be reached that either the truly safe tire has never been invented or that it is not being manufactured. And the former statement is more likely to be true, notwithstanding the immense number of special tires which have been patented for both bicycles and motor vehicles.



One of America's first pneumatic auto tires was this smooth tread Goodyear of 1909 vintage. Inside is Goodyear's latest—Double Eagle Supercushion.

This mass of patents makes it difficult to get ample legal protection for a new tire or tube unless the invention is markedly original in concept. But, this is the way it should be. Apparently none of the patents give the desired ideal tire.

The large tire manufacturers have oodles of inventions from which selections can be made. Many of these are now part of the public domain because the patents have expired. However, any company spending a lot of money on development and thorough testing of a special tire or tube on which patents may have run out is doing a fine job for the industry, not itself. It may get a 60-day jump on the market, but this might not justify the cost of development.

Today many small companies are beginning to wonder if there is a public trend toward safety tubes and tires and are puzzled as to what this may portend. The thought that this may put some of them out of business is not new. This same circumstance has plagued inventors and manufacturers for more than 60 years. All have been continuously alert to the need of a truly safe tire and hundreds of inventors have rushed to the Patent Office with their pet tire ideas only to discover that the industry was not yet ripe to receive them.

Reason for Pneumatic Tires

No one has as yet produced a satisfactory substitute for the pneumatic tire which combines lightness in weight with a suitable cushion effect. And the pneumatic tire has

[*Continued on page* 22]

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

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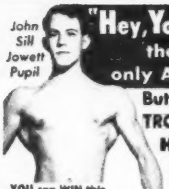

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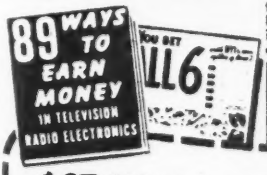

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The Editor's Workbench

Life-saving transfusions of blood plasma to wounded American troops in Korea have been a major factor in reducing our mortality rate to the lowest in history. But reserves of plasma are dangerously low (see text).

Your Gift of Life

Let's suppose that right now, as you sit here reading this magazine, the phone rings. It's a cablegram. For you. An urgent cablegram. It comes from a city 7,000 miles away. And it says: "Your brother is critically injured. He will die within two hours unless you rush help to him at once. Hurry. His life depends upon you."

What do you do? What *can* you do? Your own brother. Dying. He needs you. Desperately. But he's 7,000 miles away. *Seven . . . thousand . . . miles!* Not even the fastest jet planes could get you to him in two hours.

And then as you stand there, without hope, the phone rings again. This time a voice says, "We have heard that your brother is dying, a long way from here. If you will give us a few minutes of your time—just a few minutes, that's all—we will save his life. Come down to . . ." and he gives an address nearby.

Now what do you do? You may feel a little skeptical that the man can really save your dying brother's life. But you don't waste any time debating it. As fast as feet or wheels can carry you, you make for the address he gave you. And on the way, perhaps, you wonder for a moment what the catch is, how much it is going to cost you in money or trouble or pain to save your brother. But you shove these thoughts aside. After all, your own brother is dying and you'll do anything—*anything* at all—to help keep him alive.

And then, when you reach your destination, you discover that what they want you to do is a very simple thing indeed. Just give them one pint of your blood—only one *pint* out of the six or seven *quarts* that flow through your body. You won't feel any pain when they extract it, quickly and easily, in a matter of seven or eight minutes. It won't weaken you for your body will speedily manufacture more to take its place. It will cost nothing. But it will do this:

It will save your brother's life.

No use asking what you do now. You give your blood gladly and you know that you have effected the most profitable, the most miraculous bargain ever made: a pint of blood for a human life.

Today's great, pressing need for human blood to save American lives will never be brought home to you and me in such directly personal terms. Fortunately, blood banks do not wait until the patient is dying before they ask us to replenish their supplies of whole blood and plasma. They try to anticipate future needs and build up their reserves accordingly.

But today, because of the vast use of plasma and whole blood in Korea—where thousands of our men have been saved because other Americans, 7,000 miles away, generously donated blood to the Red Cross—the Department of Defense reveals that the Armed Forces' blood plasma reserve is "gravely depleted." Our soldiers, sailors, fliers and Marines offer their very lives for us. The least we can do for them is to make sure the wounded will have plasma available when they need it.

There is only one source of blood plasma: the human body. Money can't buy it, factories can't make it. But you and I can give it—and along with it the priceless gift of life. Let's make a date with the nearest Red Cross collecting agency right now—today! Okay?

—*Bill Parker*

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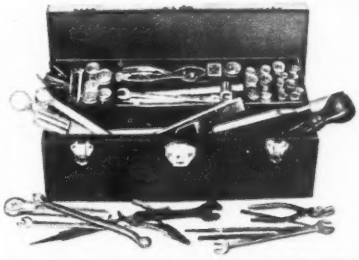

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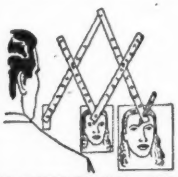

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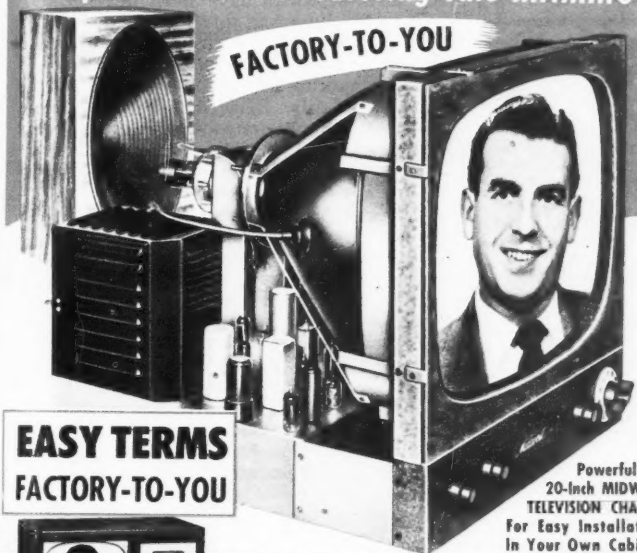

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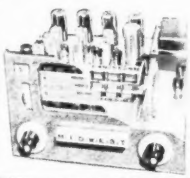

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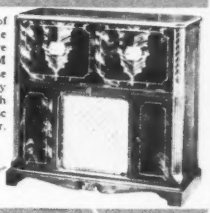

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Invention Clinic

[*Continued from page* 14]

many other assets. For example, the ability to yield over road irregularities, stones and sharp projections; relative ease of production; simple distribution of weight, hence balance; fairly good traction in all sorts of weather; good life as weighed against cost; reasonable freedom from weather and road condition variables; simplicity in making repairs quickly and inexpensively.

All sorts of tricks have been devised by inventors to duplicate this pneumatic effect and still give the freedom from trouble found in the solid tire. The patent files disclose many attempts to use solid tires to give an air-cushioned ride. In some cases the patents show multi air-cylinder spokes for the wheels with short sections of solid tire attached to a doughnut air cushion. In others, hydraulic systems have been invoked.

All types of spring-wheel substitutes also have been found. In most of these, the inventors claim that the riding ease is equal to or better than riding with a pneumatic, but it is one matter to make a statement and another to prove it. I venture to state that none I have seen would compare favorably with the penumatic.

Then, there are many patents devoted to the filling of a tire with such things as sponge rubber, springs in coiled or ball form and all manner of combinations of springs, spring-filled wheels and pneumatic spokes.

Today's inventors may avoid some pitfalls of the earlier inventors and keep from wasting time in struggling with ideas already protected by studying patent office files.

[*Continued on page* 26]

INVENTORS

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Going Up And Coming Down

Here's a picture that readers, interested in the automatic transmission pro-and-con discussions, will want to see.

The total ascent is 4700 feet and the owners of this road have found through experience that cars with automatic transmissions are very likely to run away and start down the hill. If a car starts to gain momentum and has no holding power due to automatic transmission, it is doomed unless brakes can be jammed on.

The Motor Vehicle Research division of Gale Hall Engineering uses this road a great deal for testing. Recent research reveals that it is true that a car equipped with automatic transmission is not a very safe vehicle on a climb of this type, especially on the descent.

A. J. White, Pres.
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Oops. We Forgot Something

After reading M.I. for years, I find you still haven't come up with anything to take the place of a fanbelt. Why?

John E. Babione
Lake Worth, Fla.

There just isn't time for everything, John; there just isn't time.

Think You Got Problems?

Several years ago I found what appears to be a petrified cow dung. Now I would like to know how to go about getting rid of it.

James J. McCall
West Milford, W. Va.

Why not put it back where you found it? No one will ever know.

Pinned-Up Car

Here is a photo of the most remarkable car I have ever seen. The owner is unknown and elderly, evidently a farmer. He parks it by my property every Saturday.

Note the rear—he has broken the window at the corners and chained the trunk to the body and bumper. It must be filled with gold.

Note the extra can of oil—it's wired to the fender by punching two holes in the fender. The door is locked by chain and padlock and the jack is wired to the door hinge.

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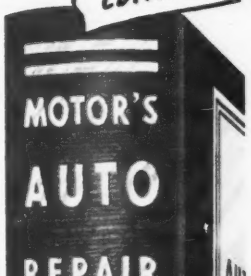

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[*Continued from page 22*]

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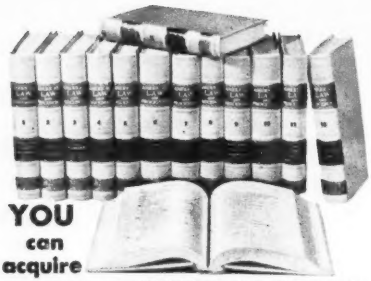

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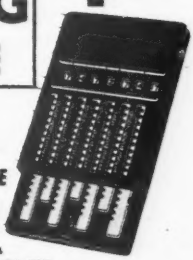

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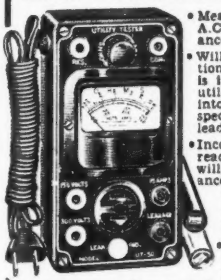

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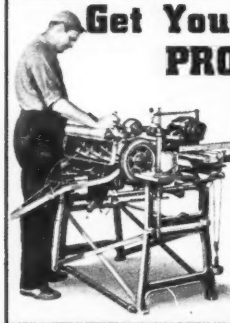

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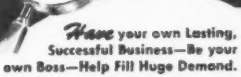

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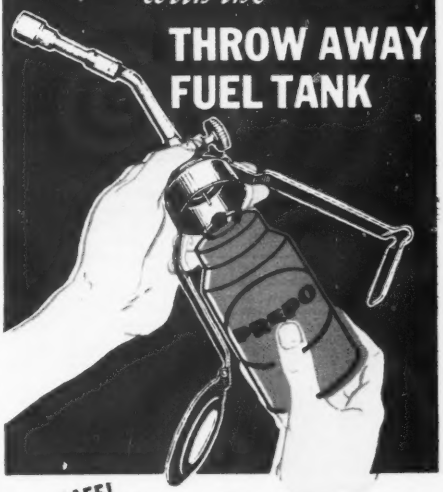

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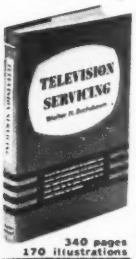

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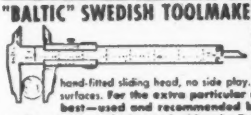

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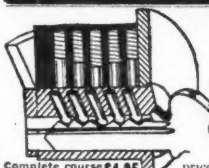

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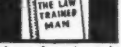

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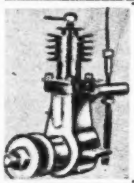

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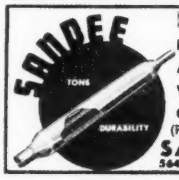

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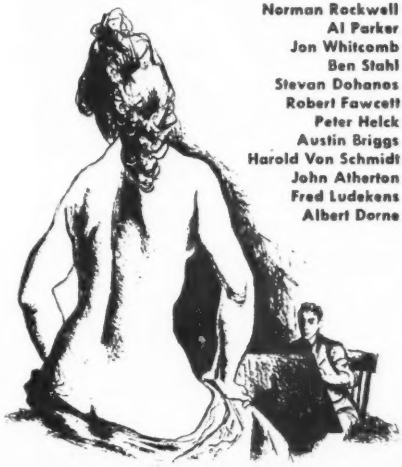

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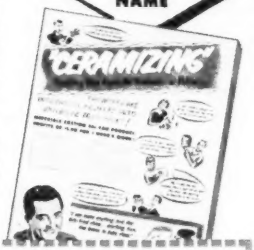

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Missing Persons Bureaus all over the country have been alerted for William F. Ferry, lower left, Judge Joseph Force Crater, middle, and Andrew and Elizabeth Toth, lower right. But they still remain among America's missing.

special features...

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More than 250,000 people—enough to populate Oklahoma City—are reported missing every year. And hundreds of these now exist only as question marks in America's police department files.

By Lester David

IN a small, stuffy flat in the Yorkville section of New York City a man and wife finished dinner. It had been a steaming, August day and they decided to stack the dishes in the sink and go for a walk in the cooling twilight. Down the stairs they went, nodding cheerfully to neighbors gathered on the stoop. They strolled along the street and around the corner—just an ordinary man and wife out for an evening walk.

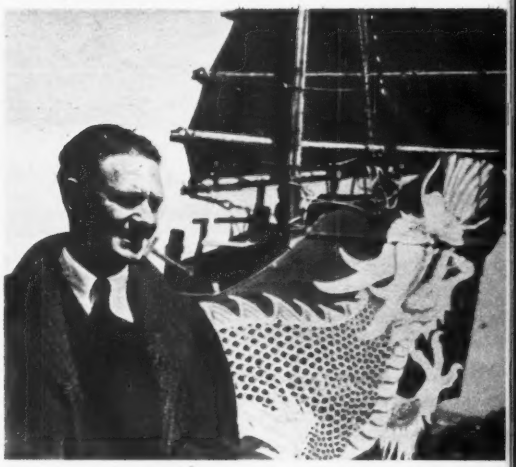
But when they rounded that corner, they stepped into oblivion—neither one was ever seen again!

Now switch the spotlight to another hot August night a number of years before. This concerns a different man who had dined leisurely with an attorney and a beautiful showgirl at Billy Haas' restaurant

Is Adolph Hitler dead or simply unaccounted for? American soldier, left, examines gasoline cans which were supposedly used to burn bodies of Hitler and Eva Braun who killed themselves in bunker, right.

In 1944 Capt. Glenn Miller, right, was lost in a plane but rumors about him still circulate.

Travel writer Richard Halliburton vanished completely while crossing Pacific in a Chinese junk.

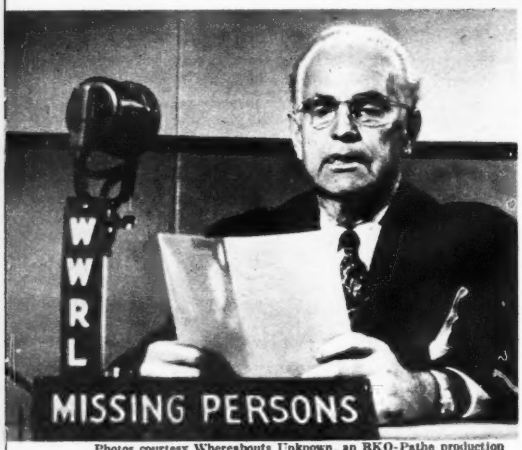


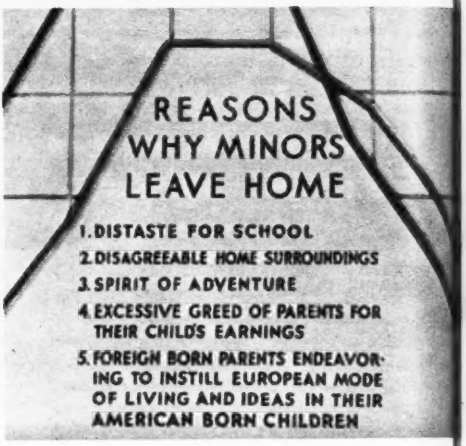
near Times Square. The tall, portly man had chatted amiably throughout the meal, mentioning offhand that he planned to spend several weeks at his Summer home in Maine. Shortly after 9 p. m. the three left the restaurant and the man flagged a passing cab. When that taxi rounded the corner, it touched off a mystery which has become one of the most baffling and frustrating of modern times. The world hunted and is still hunting, but the tall man was never seen again. His name? Supreme Court Justice Joseph Force Crater.

What moral can you draw from these two unrelated dramas? Just this—everybody remembers famous people who vanish without a trace, drop completely and utterly out of sight, but obscure people vanish too, under circumstances which are frequently just as tantalizing and bewildering as the celebrated cases.

You know about the big names like Judge Crater, Amelia Earhart and Glenn Miller but did you know that every missing persons bureau in every large police department in the U. S. has an open file on thousands of unknown little people who have dropped out of sight on street corners, in railway stations and on the highways?

More than 250,000 persons are reported missing in the U. S. each year. Almost 90 per cent of them are children, boys outnumbering girls by 25 per cent. The month of May, when Spring fever strikes full force, is invariably the peak month for disappearances. September, which brings the discouraging prospect of another school year, is just behind.





Photos courtesy Whereabouts Unknown, an RKO-Pathe production

Captain Cronin of New York's Missing Persons Bureau, top, questions relative of vanished man to complete file on case. Then description is broadcast, above, over police radio network.

In communications room of New York police headquarters, top, complete details concerning missing person are teletyped all over the nation. Above is chart showing why minors leave home.

An odd fact is that virtually all the young girls of 13, 14 and 15 who vanish from home are unusually well-developed physically for their ages. Nevertheless, contrary to popular opinion, sex plays a minor role in their disappearances. The chief reasons listed by authorities are distaste for school, disagreeable home surroundings, a spirit of adventure and excessive greed of parents for children's earnings.

What happens when a person is reported missing? Well, let's visit the Missing Persons Bureau of the New York City Police Department where a highly-geared, intricate system whirls into operation the instant a case comes to the department's attention.

A daily mimeographed bulletin, listing names and descriptions, is sent to all Y's, municipal lodging houses, newsboys' homes, girls' shelters, hospitals, police stations and morgues. If there is reason to believe the persons have skipped town, teletyped alarms are flashed to all police agencies in 15 states. On important cases 29,000 police stations throughout the U. S. are alerted.

When the cops get on a case, so thoroughly do they fine-comb the nation that 99.5 per cent are solved each year and the books are closed on them. But one half of one per cent remain open and these are the deep, dark mysteries that completely foil the law enforcement agencies. These are the people who have vanished without a trace.

People like the Yorkville couple who apparently walked out of this world when they turned that corner. Their names were Andrew and Elizabeth Toth and they lived at 318 East 78 St. Hospitals, morgues,

FBI LAW ENFORCEMENT BULLETIN

INSERT

FUGITIVES WANTED – MISSING PERSON NOTICES

CANCELLATIONS

Vol. 19 May, 1950

Published by
Federal Bureau of Investigation
United States Department of Justice
Washington, D. C.

To: FBI, Washington, D. C.

Date

ORDER FORM – IDENTIFICATION SUPPLIES

Please furnish the following:

FORM NUMBER	DESCRIPTION	QUANTITY
16-53906-1	Arrest fingerprint cards	
16-12593	Institution fingerprint cards	
16-22517	National Defense fingerprint cards	
16-12547	Personal Identification fingerprint cards	
	Envelopes	
R-88	Death Sheet Forms	
R-84	Disposition Sheets Forms	
I-12	Wanted Notice Forms	

Agency

Street or P. O. No.

City & State

(Use when ordering supplies from the FBI)

WILLIAM CARL OPFER, also known as
William C. Opfer, W. C. Opfer,
Bill Opfer

White; 78 yrs (1949); 6' 0"; 175 lbs; gray hair, spotted, almost totally bald; blue eyes; occupation - hotel clerk, farmer, taxicab operator.
MISSING: Since October 28, 1948, from Clay Center, Kansas, which he left by bus with a round trip ticket via Denver, Colorado, Salt Lake City, Utah, San Francisco and Los Angeles, California, Albuquerque, New Mexico, and Oklahoma City, Oklahoma.
NOTIFY: Director, Federal Bureau of Investigation, U. S. Department of Justice, Washington, D. C.

FFBI MP-12866 - MAY 1950

JEANNE HELEN VOGNI, also known as
"Jinx" Vogni, "Jeannie" Vogni,
Jeanne Vogni

White; 18 yrs, born March 28, 1932, at Portland, Oregon; 5' 6½"; 123 lbs; slender build; dark blonde hair; blue eyes; fair complexion; scar right cheek where mole removed; numerous moles on back; occupation - bookkeeping clerk; Social Security #536-26-8992. Relatives: Mr. and Mrs. Victor Vogni (parents), 4214 West Dakota Street, Seattle, Washington.
MISSING: Since January 23, 1950, from Seattle, Washington.
NOTIFY: Director, Federal Bureau of Investigation, U. S. Department of Justice, Washington, D. C.

FFBI MP-13676 - MAY 1950

17

F.B.I. circulates this missing persons bulletin to all law enforcement agencies, which use it as a standard guide. At right is one page of the booklet on which two vanished persons are described in detail.

lodging houses, rivers and forests yielded no clues. How could a man and wife vanish so completely in the heart of a great, steaming city?

Here's one fact police know—can you develop a theory based on it? Andrew Toth was known to carry a huge sum of money on his person—between $5,000 and $7,000. A long time before, he had lost his savings in the Bank of United States failure and had mistrusted banks ever since.

Captain Cronin of New York's Missing Persons Bureau thinks, but neither he nor the combined ingenuity of his department can prove, that someone who knew of Toth's bankroll drew up along the curb as they were walking, invited them for a ride in the country to escape the heat. They gratefully accepted and somewhere on a lonely road, the friend murdered husband and wife, hid the bodies and came back with the money.

Some day, Captain Cronin believes, a wanderer will stumble on two skeletons in the wilderness, but until then the case is still open.

Just as mystifying is the strange case of another non-celebrity, Dean F. Mix, 23, son of a Rochester businessman. At 9:30 p. m. on Sept. 20, 1949, young Mix telephoned his father and said he was catching the next train home from New York. When Mix hung up the receiver and left the phone booth he stepped into a cloud of mystery that has shrouded his whereabouts ever since.

What happened to Dean Mix? All police know is that he had arrived in New York from Hollywood five days earlier, where he had gone to sell a custom-bodied automobile he had designed. Unsuccessful, he came back east accompanied by Capt. Elmo Chester Holland, a merchant-marine master. During [*Continued on page* 174]

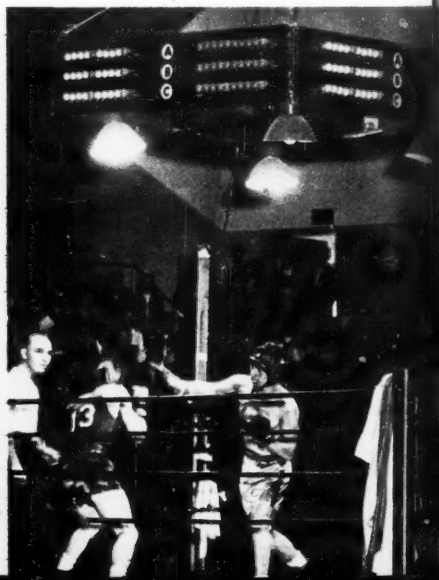
Research Jet is a new British high-speed plane, powered by a Rolls Royce Nene turbo-jet engine. Called the H.P. 88, this prototype aircraft may be the first of a whole series of Royal Air Force fighters to be turned out by Blackburn and General Aircraft Ltd. in Britain.

Bomb-Shelter Homes are circular huts of steel and cement which a colony of Italian artists built in Milan. Despite gibes of neighbors, residents claim the state of the world makes it necessary to live in air-raid shelters.

NEW in SCIENCE

Floating House is designed for people with a little bit of land and a lot of imagination. Shown at Hanover fair in Germany, it can be set up on a plot of land as small as ten square yards. Three concrete columns support a fanned-out balcony on which the floor is laid.

Electric Scorer lets boxing fans know what's going on. It's suspended over the ring and has six rows of lights on each side—two for each judge who can flash a red or blue one to indicate which fighter just scored a point.



Rifle Try-Out: camouflaged corporal tests the new British .280 rifle which may supersede the old .303 Enfield. It's self-loading, gas-operated and fires 60 rounds per minute compared with the Enfield's 15 and carries a new type of sight.

Triple-Decker Train has three different levels—a top and lower floor in the center and a middle floor in the front and rear. The middle levels are used for lounges and rest rooms. This German coach is already in daily service on the German Federal Railway.

Acrobatic Tank: hurtles off concrete ramp at speed of 32 mph. New rugged uses for this 28-ton Cromwell were recently demonstrated by the British Royal Armored Corps. We presume, for the driver's sake, interior is lined with foam rubber.

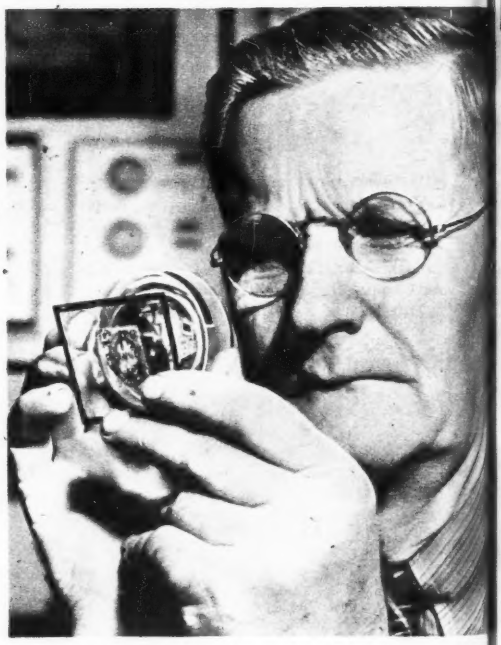
Earth Eggbeater tills evenly to a depth of 30 inches and makes a furrow 12 feet wide. This Gyro Tiller is being used by the U. S. Army to prepare the hard earth for mobility tests to measure traction of wheeled and tracked military vehicles.

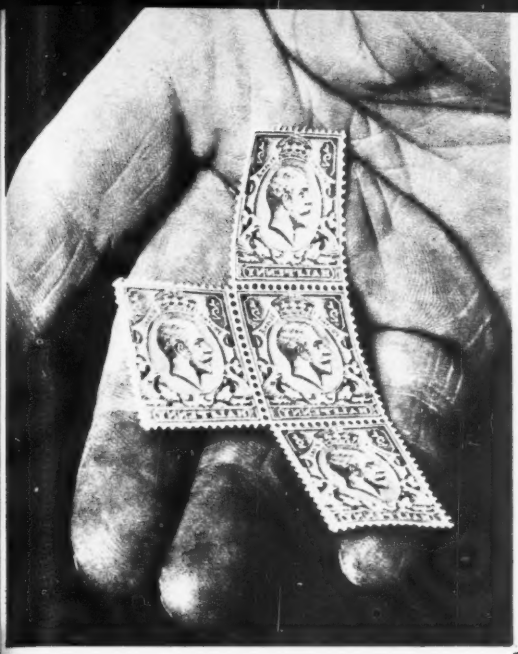
$50,000 FOR A PENNY

Call it philately or just plain stamp collecting—it's America's favorite hobby with 12 million fans searching for big-money finds.

By I. B. Neer

Among odds and ends in an inexpensive stamp collection purchased for $300, Warren Du Bois, below, found a one-cent blue bearing an August 17, 1861 cancellation, left. He claims it's worth $50,000.





Simply because the gummed side bears a reverse impression of the front due to a printing error, these halfpenny British stamps are worth $5 each.

HOW would you like to trade one penny for $50,000? Or buy something for $480 and sell it for $100,000? Or leaf through a book and find an old envelope worth $10,000?

You're interested, of course. Well, these fantastic profits were made in the world's No. 1 hobby—stamp collecting. What's more, foremost experts, dealers and collectors agree that rare stamp treasures *can still be found* by those who know what they are looking for.

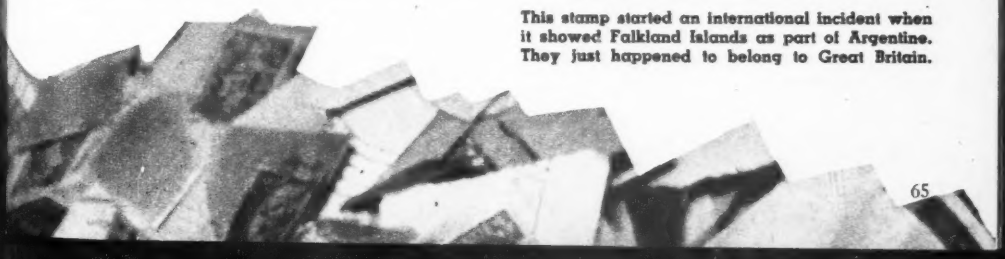
You see, stamps are now big business, with profits ranging from small to WOW. Just how big will amaze you—in the U. S. alone, according to the American Stamp Dealers Association, there are 12,000,000 collectors, 2,000 dealers, 100 auction houses, 50 philatelic publications and a host of business enterprises which live on America's mania for stamps.

But can *you* find a stamp gold mine? In stamp collecting, fate rolls the dice and suddenly someone is thousands of dollars richer. Take, for example, the 1856 British Guiana one-cent magenta which is worth $50,000 now. Not so long ago it was selling at face value and if you'd picked it up for a penny, your investment would have skyrocketed.

Then, consider the $480 investment which earned the hundred grand. Until 1857, U. S. stamps were printed in sheets of 200 and cut off with a sharp instrument. When the practice of perforations came into general use, collectors watched hawk-eyed for errors. Not long ago, two dealers pounced on 40 sheets of six-cent air mail stamps in Brooklyn, N. Y., with the horizontal perforations missing. They snapped them up at face value—and later sold the lot for a breath-taking $100,000!

And take the case of the $10,000 bookmark. A young girl was thumbing through a scientific tome in the library of her late father, a noted

This stamp started an international incident when it showed Falkland Islands as part of Argentine. They just happened to belong to Great Britain.



Washington educator. Between two pages lay an envelope with an odd-looking stamp bearing a facsimile of President James Buchanan's signature and a large figure 10 enclosed in a simple border. Curious, she showed it to a family friend who immediately spotted it as a rare postmaster provisional. Before the first U. S. stamps were issued back in 1847, the postmasters of 12 cities circulated their own stamps privately. And this one, a Baltimore issue, was a rare one—$10,000 rare to be exact.

A Washington businessman once parlayed $24 into $15,000. He bought a sheet of 100 24-cent air mail stamps of the first 1918 issue. He got one of the few sheets in which the airplane was printed upside-down by error and a dealer paid him $15,000 for his lucky break.

Amazing finds like these are by no means rare. Take the word of Edwin Mueller, co-owner of the Mercury Stamp Company, editor of the Mercury Stamp Journal and a member of the Friedl Expert Committee, an independent organization which checks on the genuineness of rare stamps. In his latter capacity, Mr. Mueller has appraised hundreds of valuable finds and is convinced that many more are yet to be uncovered.

"Everyone who keeps his eyes open and knows something about stamps can still make lucrative discoveries despite the fact that stamp-collecting has been going on for more than a century in this country," he says.

To prove his point, Mr. Mueller cites a recent case in which a Brooklyn youth wandered into a small shop and bought a few dollars worth of Austrian reprints at a quarter each. He took them home, checked them in a catalogue and what he learned sent him flying down to the Friedl committee. The report astounded and delighted him—the stamp he had bought for two bits turned out to be a "scarlet mercury," an Austrian newspaper stamp of which only 30 to 40 copies are known to exist and which is catalogued at $2,000.

So take the word of Peter G. Keller, executive officer of the American Stamp Dealers Association: "With specialized knowledge, you can pick up what is termed in the trade as sleepers and thereby make an almost immediate profit."

Are there still sleepers left? Haven't the hordes of collectors skimmed off all the cream by now? Mr. Keller's reply to ques-

Improvised stamps used by local postmasters, before Congress authorized Federal stamps, resulted in envelopes like these, now collectors' items.

Roving stamp stall is a common sight in Paris' open-air stamp market. It's owner, Pol Charriaud, says it's world's only traveling stamp salesroom.

Royalty goes for philately, too. Here, England's King George inspects his own collection while Royal Stamp Curator, Sir John Wilson, looks on.

Sketches prepared by philatelist Franklin D. Roosevelt in 1940 later became actual stamps. The original drawings are now almost priceless.

World War II Office of War Information sent death's head fakes, right, of 1937 Hitler stamp, left, to German next of kin. The fakes are worth hundreds now.

tion one: "Definitely. There are many." His reply to the second: "No!"

Well, then, how can you find the sleepers? Bernard D. Harmer, vice president of H. R. Harmer, Inc., one of the world's largest auction houses with galleries in New York, London and Sydney, Australia, tells you:

"To be a winner, you must know stamps and their markets. You must know what you are buying, what the rarities are, the post marks, the shades of stamps, the differences in paper. Only then can you spot the big ones."

Question: But isn't it an impossible task to know everything about the whole vast field of stamp collecting? Haven't thousands of books been written on the subject? Isn't it a formidable task you are imposing, to learn everything?

Mr. Harmer's answer: "That's just the point. You *don't* have to know everything. There's a trick to it. Concentrate on *one* specific category—one country or one group. It's a good idea to select an inexpensive stamp of an unpopular nation. Get all the literature you can lay your hands on relating to it. Hit the libraries in your town. The Collectors Club in New York City has one of the finest stamp libraries in the world and it is open to the public during certain hours. The New York Public Library has a truly fine philately division and excellent material is available in most large city and university libraries. In addition, there are literally thousands of stamp clubs throughout the country where members swap books and information. And you should equip yourself with the Scott Catalogue, the stamp collector's bible, through which you can learn the current values.

"Now here's the big point—a stamp dealer, with a general knowledge of the entire field, can only know so much about a particular category. Your job is to acquire knowledge in your group beyond that of the average dealer so that you can spot a sleeper among his wares."

Question: Can you also still find sleepers in attics, trunks and old hiding places or have they been long since flushed out?

Mr. Harmer: "Stamp collectors are legion but they [*Continued on page* 177]

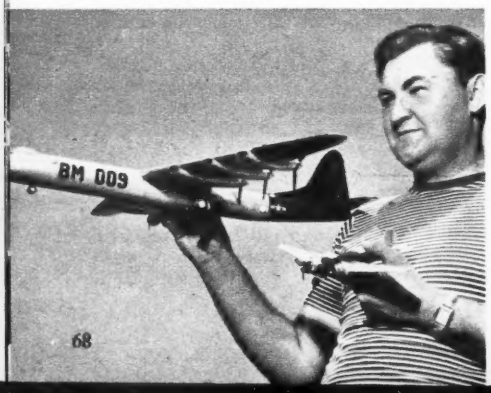
Because plane was printed upside down on these 1918 air mail stamps, they're worth at least $4,000 apiece instead of their original 24-cent cost.

Our Model Air Force

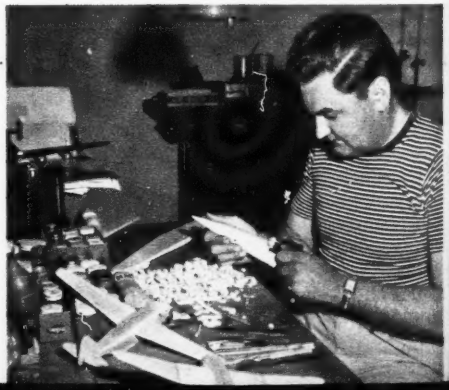
THE late Gen. Hap Arnold, one of our first pilots, dreamed of an airplane museum to record the tremendous strides of American aviation. "Save one plane of each kind," he asked the Air Force.

Reserve Lieut. E. M. Gyerman listened to the General and has done the next best thing. He has started a museum of models, constructed by himself, which includes all of our great military designs. He has 166 in all and he hasn't skipped a variation. For example he has five versions of the P-38 and five of the P-47. He does it all with a band saw, a pocket knife and an X-acto kit. •

In his right hand Gyerman holds the B-10 bomber, 1938 vintage. Big job is early six-engine B-36.



He shapes the fuselage of an XF-12 Rainbow. Foreground is a C-110 cargo hull. Left is an XC-122.



Witty Whittler

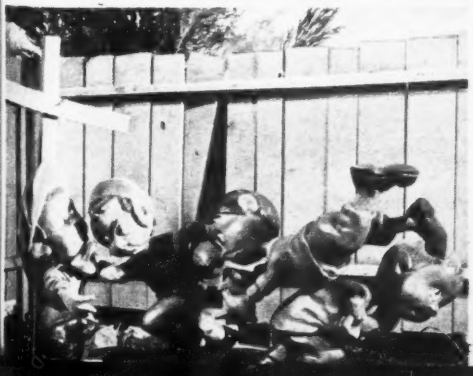
IT'S easy enough to whittle wood but it's no mean feat to whittle wit. However, one of the few men who can do this is Ralph Wirth of Pittsburgh, Pa.—he manages to get a laugh into every square inch of his woodcarvings. Ralph's specialties are caricatures and cartoons in wood—the ideas are all original and they're used in window displays by many department stores. Wirth never has any trouble unloading any of his stock because the carvings are snapped up by eager buyers just as quickly as his whimsical knife turns them out. •

Pine puppies—dogs with a sense of humor—are the best sellers of witty whittler Ralph Wirth.

Hunter in rear, imitating moose call, gets fast action for partner in Astonished Moosehunters.

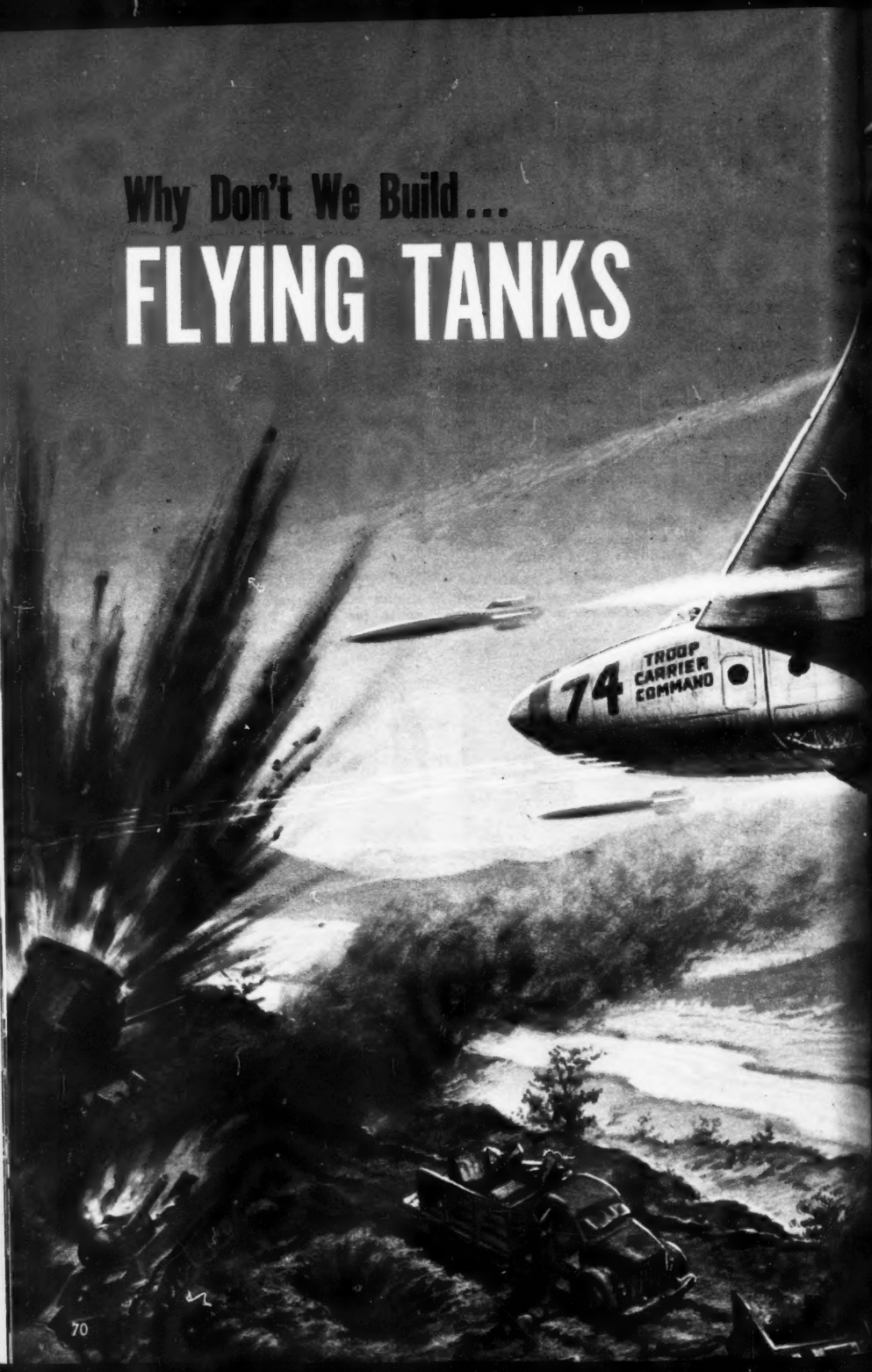
Sleeping Fisherman is what Wirth calls this cartoon featuring a bear and skunk in minor roles.

In the same comic vein, The Little Fisherman pokes fun at the big fish caught by a halfpint.



Football Game is a study in action as halfback takes off for the goal line, defense or no defense.

Why Don't We Build...
FLYING TANKS

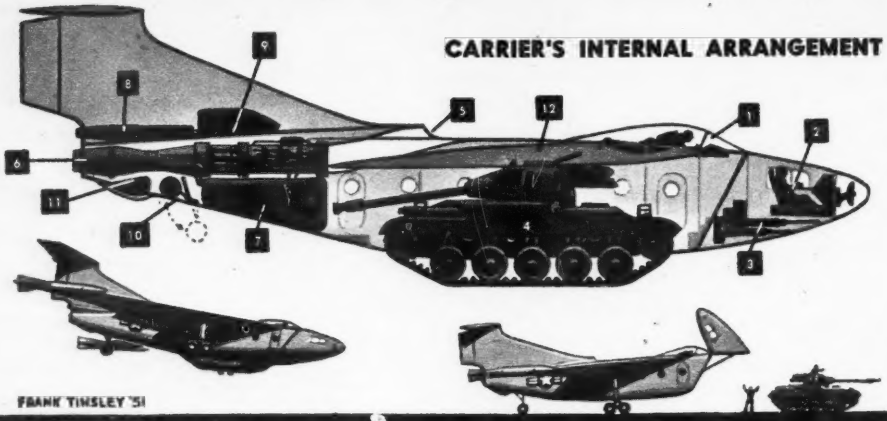


Armored divisions with wings are needed to support our airborne infantry, artillery and supply lines.

By Frank Tinsley

THE importance of airborne armies has been brought into finer focus by the drives and counterdrives of the Korean war. Many of our keenest military minds now feel that there is only one answer to the threat of Communism's armed hordes. This is the superior mobility of highly trained, heavily armed, airborne task forces. Like minute men, they can be rushed instantly to any point of attack, withdrawn with equal speed and poised again for the next blow.

Thanks to our experience in World War II, the Berlin Airlift



1. Pilot in prone cockpit
2. Navigator-radar-radio operator
3. Six 20mm shell guns
4. Tank coupled rigidly to airframe
5. Air intake port for engine
6. 10,000-lb. thrust engine with after-burner
7. Jet fuel tank for engine
8. Liquid rocket engine for take-off and combat
9. Fuel tank for rocket
10. Retractable tail wheel
11. Parachute break for landing on short fields
12. Sweptback wings of large area

At left, tank carrier is about to land on its free-wheeling tank treads which replace conventional heavy landing gear. Above, tank is lowered and carrier is raised on its wheels. Tank emerges.

and the present MATS overseas operations, we have built up an invaluable know-how in the art of mass military flight. Our only lack is new aircraft and ground equipment designed specifically for winged warfare.

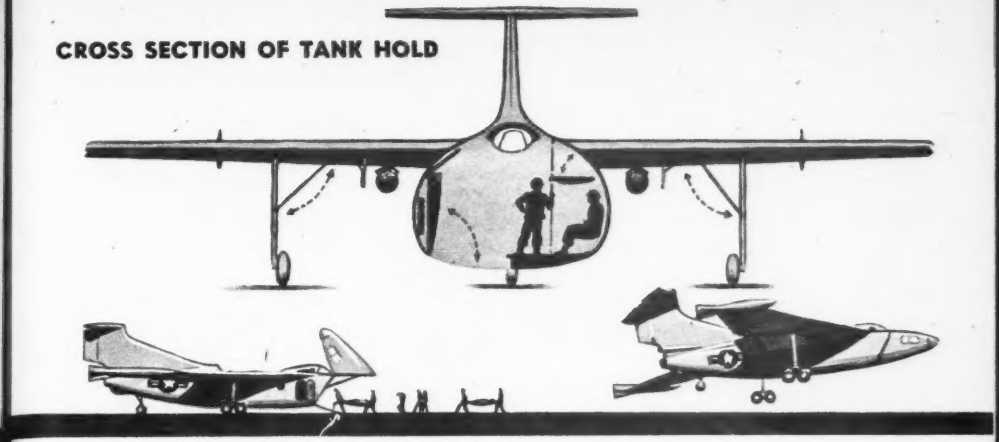
Much of this is now in the works. Guns, motor vehicles and material of every description are being revamped for air transport. Excess weight has been sweated off, bulk cut down and dimensions shrunken to fit existing planes. Even now our airborne divisions are being equipped with heavy artillery, motor transport, complex communication nets and complete field hospitals, all droppable by parachute. The only item that seems lacking, unfortunately, is the one most vital in modern, mobile warfare—armor!

The problem is not being ignored. Specially designed, ultra-light tanks have been carried aloft experimentally. These, however, are so skimpily armed and armored as to be of little practical value on the battlefield. What is really needed is a relatively inexpensive, semi-expendable air carrier, capable of lifting the standard Walker or Patton tank complete with its crew, fuel and ammunition. This is admittedly a tough assignment. The modern medium tank with its heavy gun, armor and service load probably is the heaviest single package in the whole roster of military equipment. None but the largest and most powerful of today's piston-engined planes can tackle it. In the accompanying illustrations, one possible form of such a carrier is shown.

In this model, the necessity for a cargo hold with an ultra-heavy floor is by-passed by slinging the tank in a bottomless well situated at the plane's center of gravity. When loaded, the tank's bottom plates seal this opening so that only the lower portion of its tracks protrude below the plane's belly. Coupled rigidly to its structure, the tank bears the aircraft's weight while on the ground and permits the latter to take off and land on the tank's free-wheeling track gear. This eliminates the large landing wheels that would otherwise be necessary to handle the load. In addition the plane is equipped with light auxiliary wheels for use when not carrying tanks.

This light landing gear is fitted with jacks so that the plane can be raised slightly for the tank's entry. The plane's nose section is tilted upward out of the way and the tank backs directly into the cargo well. The plane then is lowered into coupling position and the tank secured rigidly to its weight-bearing structure. The main landing gear then is retracted a bit further to a point where it serves as side steadying wheels when the plane taxies to its take-off strip. In landing, the process is reversed and the tank is released ready for action.

In order to make the tank carrier available for other missions, a folding door, bucket seats and litter attachments are pro-



At top is shown cross section of plane's tank hold. Bucket seats and litters fold when tank is carried. They are lowered and locked for carriage of troops, battle casualties, army personnel, etc.

At left, after tank is unloaded, carrier is lowered to normal position for loading of wounded or supplies. Then it takes off, at right, on its own wing-wheels for return flight to its base airport.

vided to convert the open well into a snug cargo hold. With the floor swung down and locked in place, wounded can be evacuated or troops and miscellaneous cargo transported at high speed. The generous wing area required for tank carriage permits short take-offs and slow landings on restricted fields. Take-off may be augmented by Jato assist or by the boost of a liquid rocket engine as shown in the illustrations. A B-47 type parachute brake is packed in the tail bumper to shorten landings.

Opening on the cargo hold and just aft of it is a vestibule with passenger escape doors on either side. A chemical toilet is situated here, also. Forward in the movable nose section are two more escape doors and the navigator's post. He is surrounded by radio installations and operates the radar unit mounted in a plastic nose fairing. Beneath him in the slanting belly is a battery of six 20mm shell guns for ground strafing. These are augmented by two Tiny Tim rockets carried on launchers beneath the wing roots.

The engine is mounted in the upper section of the tail and is fitted with an afterburner which, in an emergency, can almost double the 10,000-pound thrust. Air intake is through a large scoop atop the fuselage just ahead of the engine. Exhaust is directed through a nozzle in the tail below the overhanging tail surfaces. Fuel is carried beneath the engine in a large, self-sealing, non-explosive tank. The whole installation is readily accessible for adjustment, repair or a complete engine change. If necessary, a compact liquid-rocket booster engine and its fuel can be mounted in the fin root above the regular gas turbine.

A flying tank carrier such as the one described is not only practical but an absolute necessity if we are to further develop America's airborne armies. Operating from advanced air strips, it can multiply the impact of our armor by shifting it quickly from one battlefront to another, concentrating it wherever needed.

Why don't we have aerial tank carriers—right now? •

Closest so far is expensive Fairchild C-82 shown here loading a small tank.

MECHANIX ILLUSTRATED

PIN-UP CAR

1930 Bugatti Type 35B

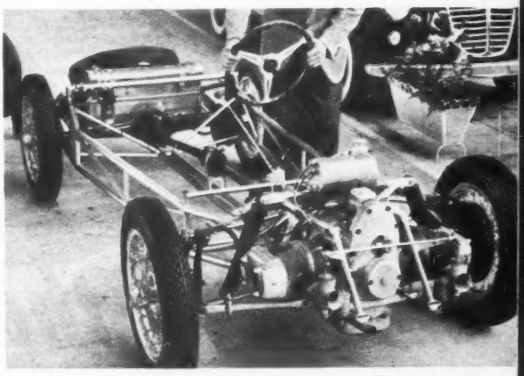
World's most successful racing model. Owner: Robert H. Fergus, Columbus, Ohio. Original cost: about $10,000. Engine has 140 cubic inch displacement, develops 135 hp, is a straight eight in two tandem blocks. Head is integral with block. Rootes supercharger..Color: French race blue.

NEW for the ROAD

Odd Racer called Cooper Jap is British in spite of its name. This 500-cubic-centimeter streamliner stole the show at the International Auto Exposition held in Turin, Italy. Engine is air-cooled. Gas tanks are on sides near driver's legs.

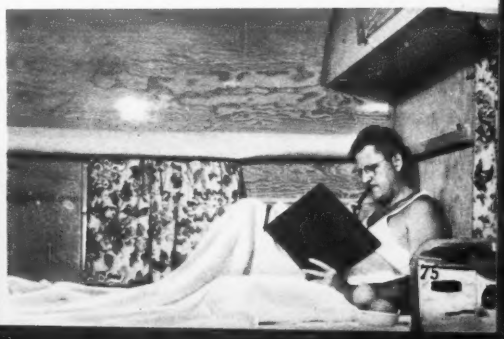
WIN $25

Send in a sharp, glossy photo of a snazzy car, old-timer or new, posed as at left with owner or a pretty gal. Include self-addressed, stamped envelope (just in case) and all vital statistics about car and owner. Mail to Pin-Up Editor, MECHANIX ILLUSTRATED, 67 West 44 Street, New York 18, N. Y.



Front-Engine chassis by Nardi was an eyestopper at the auto show in Turin, Italy. Engine has two cylinders and is air-cooled. Transverse springs are used in front. Fuel from gas tank in rear is pumped to a small header tank on engine.

Rent-Free Home is the brain child of Joe Sinkowich, former truck driver who enrolled in the University of Miami. Below, he leaves home to attend class in the building in the background. Bed is comfortable for studying, lower right.



MI Tests the '51 Pontiac

MI's automobile tester was agreeably surprised by the new Eight. He found it about five miles per hour faster than the '49 model with a pickup that's hard to beat.

ACCORDING to popular rumor, the last time old Chief Pontiac was seen around he was peddling Hadacol from the steps of the Book-Cadillac Hotel in Detroit. But it is no rumor that his best-known namesake in these parts, a fleet car called Pontiac, is very much alive, as your editor Bill Parker and I discovered on a recent safari to the City of the Upside-Down Bathtubs.

We had a double-barreled motive in tripping out to the motor moguls' metropolis. For one, we wanted to run a test of the old chief's newest papoose on the kid's own G.M. hunting grounds. For another, we wanted to take in Bill France's 250-mile NASCAR stock car race at the State Fair

Grounds, a feature of Detroit's 250th anniversary. And it turned out that there was a closer relation between the two missions than you might think.

The NASCAR race was a slam-bang clambake in which almost every stock car, from a Henry J to the winning Chrysler V-8 New Yorker, was represented. The stands were jammed with automotive brass from just about every company. I have a feeling that many of their beaming complexions were slightly tarnished when the race was over. Here's why:

A gruelling stock-car race such as this does more than prove the safety of the modern all-steel body. In two hours this NASCAR shindig revealed more faults and weaknesses in the modern car than any manufacturer's tests could uncover in ten years. It proved that the much vaunted automobile proving grounds are actually only 50 proof.

At the NASCAR race we saw a Caddie that went out of control when a tie-rod fitting snapped and the front wheels did a spread eagle. I had seen this happen before to Caddies in these races. Hudsons, Studebakers and Fords boiled over after a few hard laps. An Olds 88 threw a front wheel on a hard turn and there were a host of other unbelievable breakdowns that made a guy stop and wonder whether these same things might not happen to his own car.

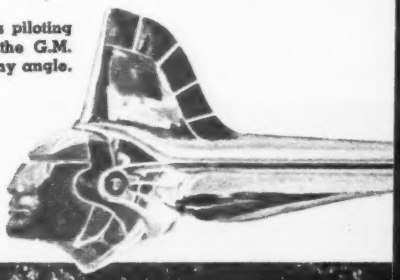
Seriously, I think every time there is a real stock car race like the NASCAR deal all the company test engineers should be made to sit in box seats to watch and learn. Then the red glow from most of their ears would resemble a lineup of neon signs. They'd learn more vital things about how their products fly apart in two hours than they have learned since the invention of the automobile. What good are the proving grounds if they don't show up these weaknesses?

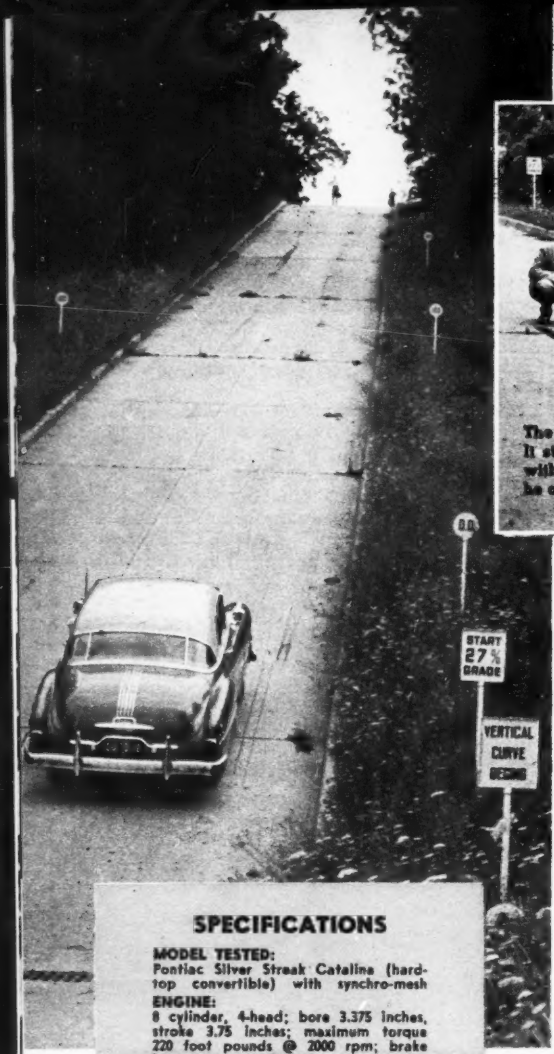
Two days later, out at the mammoth G.M. proving grounds, I saw hundreds of guys busily rushing here and there, stopping and starting cars with all sorts of apparatus trailing from them. What big test did I see? Well, in a small canyon on the huge lot I saw a group of engineers using the latest sound recorders to make a horn test of a new car.

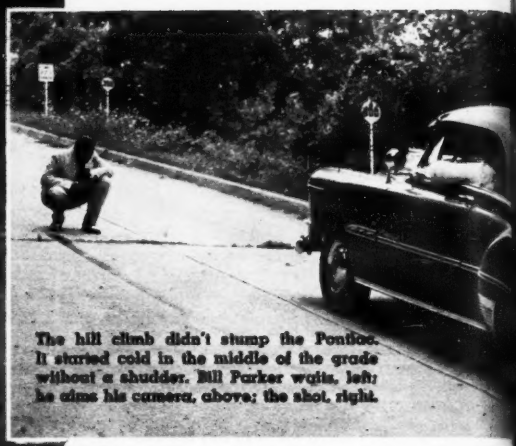
Anyway, having wangled permission to run a new Pontiac around the G.M. park, maybe I shouldn't be too critical of the way they hold their own tests. For in spite of the somewhat dubious cooperation of a couple of skeptical gents who went along as chaperones to make sure we didn't louse up their track, we ran a real test on the car

The picture at left was taken by Bill Parker while Uncle Tom was piloting the Catalina at an honest 90 mph along the high-speed rim of the G.M. track. Below, this model is a real glamour gal when viewed from any angle.

by Tom McCahill







The hill climb didn't stump the Pontiac. It started cold in the middle of the grade without a shudder. Bill Parker waits, left; he aims his camera, above; the shot, right.

SPECIFICATIONS

MODEL TESTED:
Pontiac Silver Streak Catalina (hardtop convertible) with synchro-mesh

ENGINE:
8 cylinder, 4-head; bore 3.375 inches, stroke 3.75 inches; maximum torque 220 foot pounds @ 2000 rpm; brake horsepower 116 @ 3600 rpm; compression ratio 6.5 to 1. cubic-inch displacement 268.4

DIMENSIONS:
Wheelbase 120 inches; overall length 202 3/16 inches; tread 58 7/32 inches front, 59 3/64 rear; width 75 11/16 inches; height 65 inches; weight 3433 pounds; standard tire size 7.10x15; gas tank 17½ gals

PERFORMANCE:
0 to 30 mph, 4.4 seconds
0 to 50 mph, 10 seconds
0 to 60 mph, 13.9 seconds
0 to 70 mph, 18.5 seconds
One-tenth mile from standing start, 11.6 seconds
Half-mile from standing start, 32.2 seconds
Top speed, 90 mph

SPEEDOMETER ERROR:
At 60 mph on speedometer, actual speed 57.69 mph
At 90 mph on speedometer, actual speed 85.71 mph

and learned some surprising things about it.

The Pontiac is the fifth most popular car in America from the standpoint of sales and there's a good reason for this. As you know, it comes in two packages, the Six and the Eight. They range from the bottom of the medium-priced bracket right through to the Catalina Eight which is at the top of the same bracket. The Pontiacs are as reliable as a Republican majority in Maine and they last and last and last. Tie this up with plenty of good looks and top-flight performance, and you have a selling wildcat. I don't like all the chrome strips it's loaded with, but that is only my bald-headed bias. Actually the car has a glamorous silhouette and

looks good from almost any angle. It is comfortable to ride in and, by American standards, holds the road and corners reasonably well.

Our car was the model known as Catalina, the hardtop (unconvertible) convertible. The last time I tested the Pontiac Eight was out in California almost three years ago. I reported at the time that this car was a sleeper in the performance department. Now it's even more so. The engine, which was a 104-hp job back in '49, now boasts 116-hp and really pushes this rig over the ground. The job I tested was equipped with synchro-mesh rather than Hydra-matic. I asked for the synchro-mesh, which is still standard on this make, to find out just how much performance these barges could show when given a fair shake. Hydra-matic cuts down top speed and pickup considerably.

My first surprise came when I ran through a series of high speed sprints, not two ways but four ways. On the huge G.M. testing lot it is possible to make full-speed north, south, east and west runs. The air was absolutely still and every run over a measured course showed a real 90 miles an hour, although the speedometer was showing 98 to 100. On one run we almost hit an honest 91. To the hotshot clan this may not sound like much. But I was surprised because a true 90 is very fast for a 116-hp engine pushing a full-sized car. It is a good five mph faster than I could get out of the 1949 model. The acceleration tests were equally impressive. Zero to 60 averaged 13.9 seconds [*Continued on page* 164]

The water in the trough was wet (ask the photog, left) but none of it crept into the car's ignition.

McCahill Drives the English Singer

Though no ball of fire in acceleration, this little four-seater handles almost as well as a big sports car, our expert finds.

THE first time I saw the post-war English Singer, the little sack of bolts didn't send me. That was several years ago but I distinctly remember thinking at the time that while it vaguely resembled a mousetrap, maybe even a *better* mousetrap, I couldn't quite visualize anybody whacking down a forest to beat a path to its door.

Since then I have seen more and more of these self-propelled egg crates on the highways, especially around the plushier resorts where broad A's mingle with the heady scent of $50 perfume and $20 corn-squeezings. But I wasn't really impressed until I peered in the window of George Schrafft's Foreign Motors showroom in Palm Beach and saw a shiny little Singer sandwiched between an XK 120 Jaguar and a $6,000 Aston-Martin and flanked by Simcas and the likes of them. The Singer looked amazingly good among that bunch of toffs so I decided maybe I ought to give it a closer look-see.

Don't let the name Singer mislead you—it has nothing to do with that well-known pants put-togetherer, the sewing machine, even though both devices have power plants of similar output. English Singer sports cars and engines in pre-World War II days were pretty hot tomatoes. In the 1930's, Singer built some real 100-mph sports cars that gave the back of their hands to many a competitor in British road races. As for the present-day, 1 1/10-litre (slightly larger than a Dixie cup) Singer

with overhead camshaft, which is the ingenue of this piece—glue down your toupee, Bertie, and we'll give it a go.

The Singer's lines are slightly reminiscent of the sleek imported sport phaetons of the late '20s and early '30s, as seen through the bottom of a Coke bottle. The seats and all inside body features are as cute as a bug's ear and, considering the car's price (about $1500), are very impressive. For example, the doors have a small roller built into the running board to make them open and close smoothly. On the passenger's side of the instrument panel is the biggest casket handle I have seen on any sports car, large enough for Hot Rod Homer's pal Gus to hang on with both hands, if he wants to, instead of sailing through the air like a clay pigeon on the first extra tight turn. In a car as unpunchy as the Singer, this precaution may be a bit unnecessary. But the effect is good. The seats are nicely pitched and so is the steering wheel. The four-speed gearshift handle is easy to reach. All good features.

The best part of this job is in the driving. Curiously enough, the pint-sized Singer definitely has a big sports car feel and it corners like a dream. It only falls down when you try for an extra burst of power in counter-controlling after coming out of a slide. For instance—I posted my photographer-wife in the middle of the road about 30 feet from a hard curve and told her not to move when I slammed around the corner. Just shoot the picture, I said. Well, I came around in a rubber-burning slide, corrected, and was heading right into the snoot of the camera for an action shot. I barrelled the Singer to counter-correct—but the barrel was empty.

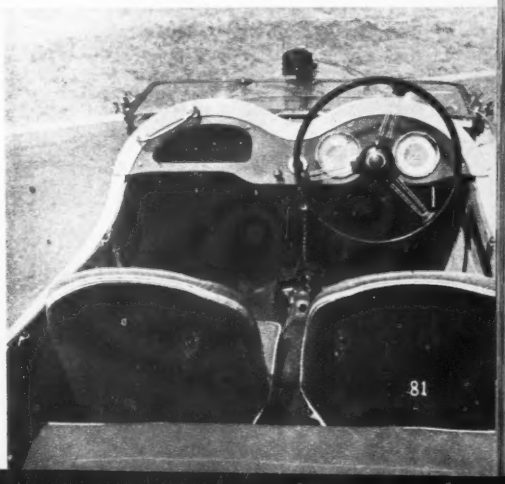
My wife was in a bad spot. I stood on the brakes and cut the wheels for an uncontrolled slide. The car stopped just six inches from the camera and from my wife, who held her ground like Horatio at the bridge. Phil Stiles, who was riding with me, let out a sigh of relief. (I was relieved, too—good cameras are hard to get.) After this little experience I went into my regular test which came to an abrupt close when some Palm Beacher phoned the cops that a maniac (same word my wife used) was racing automobiles around the countryside.

Actually, this car packs all the wallop of a cream puff. But if you rev it up carefully through the gears it's amazing how, with a little imagination, you can almost kid yourself into believing you're driving a powerful sports job. I'd like to own one of these egg-beaters because they handle so nicely. I got quite a boot out of this baby phaeton when I slammed into corners and watched the tail slide around like a big-time Grand Prix racing rod, minus the danger. I think these Singers would be swell practice cars for big sports car drivers to learn on because, with the exception of high power skids and recovery control, they will give you every performance sensation of the big car, in miniature.

All my tests were made under perfect conditions, which were: still air at less than ten feet above sea level, outside temperature of 72 degrees. As I have already stated, this little car is no ball of fire but despite comparatively slow performance, its superb handling and nice feeling all around make up for a lot. Zero to 30 averaged 7.3 seconds. Zero to 40 was 12.6, zero to 50 was 19.9 and zero to 60 took 28.9. The speed-

Typically British bumpers are much too small by U. S. standards. Note "classic" front-end design.

Oversize "casket handle" at left of open glove compartment enables passenger to hang on in turns.



Roller set in lower edge of door frame makes for smooth opening and closing. Car weighs only 1,750 pounds and gets about 30 miles to a gallon of gas.

Like other British cars, Singer uses a 12-volt electrical system. Tidy 4-cylinder engine has overhead valves and cams, develops 36 brake hp.

ometer was a trifle slow. Sixty mph on the clock was actually 60.79. Top speed was about 72 mph. I say "about" because before I completed my two-way high speed runs and half-mile checks the local gendarmes took so much interest in the activity I couldn't double-clock the top speed for accuracy.

Phil Stiles, who helped me with this test and who is the secretary of the Sports Car Club of America's Florida branch, owns an Aerodynamic H.R.G., another English sports job. H.R.G. are the initials of a guy named Godfrey (not Arthur) who designed the rig. The reason I tell you this is because the H. R. G. is powered by a slightly bigger 1½-litre (less than half the size of a Chevvy engine) Singer engine which is a very potent little pony. This H.R.G. engine is what is left of the famous racing Singers of the '30s, the erstwhile 100 mph kids. If the Singer boys ever decided to put one of their own H.R.G. engines in this Singer roadster instead of the 9-canarypower plant they now use, this little roller skate would be a hot one for sure and something to be coped with at any sports car meet.

In summing up, I think the Singer is a swell small car for the money. It does not have the overall, outstanding quality of an M.G. two-seater but it has more passenger room and it costs several hundred dollars less. It rides exceptionally well and, believe it or not, will stand an awful beating. One Singer that I know of has been running around Palm Beach for nearly two years. It has never been inside a garage and is rarely serviced. If you have been in this hot, salty climate for any time you know that Florida can make most new cars look like antiques in less than a year. But when I last saw this particular Singer, it looked almost new. The chrome and paint showed hardly any pitting although my own new Caddie, after only a few weeks of Florida sun and salt air, looked as though it had smallpox and had to go into a paint shop for rust removal and all-around touch up. •

SPECIFICATIONS

MODEL TESTED:

1951 Singer Nine Roadster, Model 4A

ENGINE:

4 cylinder, OHV and OHC; bore 60mm, stroke 95mm; brake horsepower 36 @ 5,000 rpm; compression ratio 6.9 to 1

DIMENSIONS:

Wheelbase 91 inches; overall length 152 inches; tread 45 inches front, 45 rear; width 56 inches; weight 1,750 pounds; standard tire size 5.00x16; gas tank 8½ gals

PERFORMANCE:

0 to 30 mph, 7.3 seconds
0 to 40 mph, 12.6 seconds
0 to 50 mph, 19.9 seconds
0 to 60 mph, 28.9 seconds
Top speed, 72 mph

SPEEDOMETER ERROR:

At 60 mph on speedometer, actual speed 60.79 mph

Car-Top Penthouse

HERBERT Schmiege of Saginaw, Wisc., was just another weary cross-country motorist who traveled into the wee hours of the morning looking for a place to sleep. But that was some time ago. Now he brings his house with him.

His Car-Way is a collapsible tent which can be erected on the top of a car in a few minutes. It is 6x8 feet and can sleep four. Its welded frame has sponge-rubber mounts in front and connects to bumper in rear. Tent weighs 260 pounds. •

Zippers open each end, below left. There's plenty of room, lower right. Floor is plywood, air mattress.

Gadgeteering Sherlock Holmes

Jacques Bril is a private eye with an inventive mind—specialist in "scientific detection of deception."

By H. W. Kellick

Concealed camera attached to leg of Bril investigator has proven effective means of getting evidence.

ON a Friday afternoon in February 1944, a tense courtroom heard a Brooklyn jury bring in a verdict of guilty against Murray Goldman on a charge of attempted rape. Judge Samuel Leibowitz had no alternative but to sentence Goldman to a 10 to 20 year prison term.

Somehow, though, the Judge was worried about discrepancies which had cropped up during the course of the trial. So he called in a criminologist who gave Goldman a lie-detector test. After carefully examining the convicted man, the criminologist unearthed some vital information which showed Goldman to be innocent.

A few weeks later, a new trial was held and Goldman got off scot free!

The criminologist who played such an important part in this noted case was Jacques Bril, a gadgeteering Sherlock Holmes. Operating from a modest uptown office in New York, he has solved crimes of every description for more than 22 years.

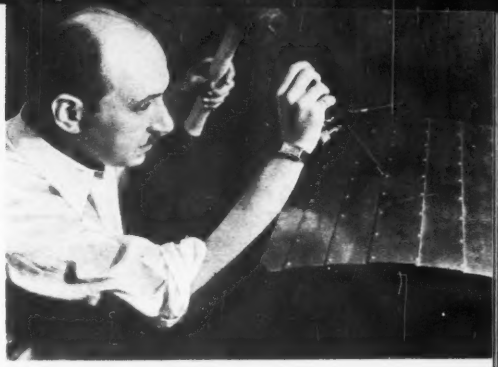
Employing modern electronics, including many of his own inventions, Bril traps his man through sound, sight and smell. He describes his work as "scientific detection of deception."

Bril works behind the scenes and many people he has sent to prison never even know of the part he played in their conviction for his clients are mostly law enforcement agencies. When they are unable to solve a crime in their respective community, they call in Bril to crack it. His

services are expensive—he gets as much as $3,500 a day. But he's worth it for Bril has never been stumped by a case.

Not long ago, for instance, in an Eastern city police were baffled by a case in which a man was stabbed to death. Although a knife was plunged through his heart, they could not detect where it was pulled out nor could they find a knife.

When Bril took over, he too was puzzled. However, he examined four likely suspects, eliminating three. The home of the fourth man was wired by Bril with listening-in



Criminologist Bril's work hasn't made him any too popular with a lot of criminals so he has devised this metal shield, above, which fits into a special vest, below. It's thick enough to stop bullets even from a .45 caliber machinegun.

As Bril installs induction coil of listening device, conversation is amplified and picked up by his assistant who records it completely in shorthand.

devices. Also, Bril used his Snoop-A-Scope, a device through which he could see his man in the dark but the suspect could not see him. Finally, from information collected on wire recorders, Bril was able to break the case.

"The killer was an ingenious fellow," says Bril. "He stabbed his victim with an icicle and the murder weapon melted away before police found the body."

In another recent case, Bril had to employ all kinds of scientific measuring instruments to get his man. Called in by an insurance company to investigate a fire claim of a wholesale woolen plant owned by two partners, Bril had no sooner gotten on the job when things began to pop.

First, after investigating the background of all employes, including the partners, Bril found that one partner was independently wealthy due to outside interest. The other partner was living beyond his business income and was deep in personal debt.

Bril took fingerprints of everything. While rummaging around the rear of the building where trucks filled up with gas from a company-owned pump, Bril found a latent print on a gasoline can.

He then examined every bit of debris in the four-story plant. Four days later, while working on the third floor, he found a charred gasoline can with a print that matched the one on the other container. Bril also picked up a man's tie clip. After examining it, he recalled seeing the indebted partner wearing an identical copy. To make sure, he called on him that day and sure enough, he was wearing an identical clip.

Next day, Bril decided to wire his home and put in recording machines. Listening in one evening, Bril overheard the wife ask, "When are you going to repay Uncle Charlie?"

"When I get the insurance money," said the partner. "And I'll have enough left over to buy you a mink coat." Bril heard him talk about the value of time. "All life revolves around time," he said. "It's lucky that my partner was away so that I could take advantage of time."

"Are you sure it was safe?" asked his wife.

Shortly after, Bril inveigled him into taking a lie-detector test, which revealed a lot of hesitancy. Confronted with these results, the playing back of the recorded talk with his wife plus the other bits of evidence, the partner broke down and confessed setting the place on fire.

Bril is a staunch advocate of the use of recording devices—he says they have revolutionized crime detection. Bril says with a sly twinkle, "I can wire your house and you'll never know it."

How can it be done? Well, the investigator can pose as a telephone repair man or meter reader. Once inside the house—and before your very eyes—he can wire your house without your realizing it.

Tape recorders also are valuable. Small microphones and transmitters can be secreted in innocent objects like umbrellas, books or canes. Equipped with this setup, the operator can carry on a conversation with a suspect while walking in the street while a car close behind records the whole thing.

Bril's interest in electronic crime detection dates back to 1929 when, as the Uni-

versity of Michigan, he wrote a thesis on Scientific Detection of Deception for his Ph.D. At that time he also invented a lie detector which he calls the Bril-O-Graf.

Bril's device is unique inasmuch as it operates on animal electricity and not blood pressure. Every reaction, according to Bril, provides a measured amount of electricity. When a suspect is upset or lying, electrodes strapped to the palms record the changes.

Bril fools around with other electronic gimmicks, too. His two cars, for example, are equipped with radio telephones. And when Bril is not in, he has a phone-answering device, called a TeleMagnet, which answers for him. This unusual gadget is made of an induction coil which sets off a relay which releases a switch which lifts up a tripper which lifts up the telephone receiver from its cradle which switches on a record which says that Mr. Bril isn't in but please leave a message when the buzzer has stopped. A switch then turns on a tape recorder. After the caller hangs up, Bril's phone jumps back into place and the recorder is automatically turned off. When Bril returns, a tabulator tells him how many people called. Then he turns on a switch and listens to the recorded messages.

When he goes to work on a case, Bril is like the proverbial boy scout—fully prepared. His equipment, which he can store in the trunk of the car, consists of a lie detector, wire recorder, Snoop-A-Scope, portable chemical lab, fingerprint outfit, cameras and a mess of electronic gadgets, among which is a photo-electric device called a spectrometer. By employing this machine, Bril can take a speck of paint and tell you the year, make and model of car it came from. The machine also can identify perfume and odors.

The fastest job Bril ever handled was a murder-for-revenge case in the Midwest. Only the attorney-general who engaged Bril knew that the criminologist was in town. No one, not even the attorney-general, knew where Bril was staying.

Yet, a couple of minutes after Bril checked into his hotel, he received a mysterious phone call.

"Bril," said a man with a sharp tongue, "I've got to see you pronto." "Who are you?" demanded Bril, "and what makes you think I'm Bril?"

"Never mind," explained the stranger. "You're Bril. I'm in the house and I'm coming up to see you."

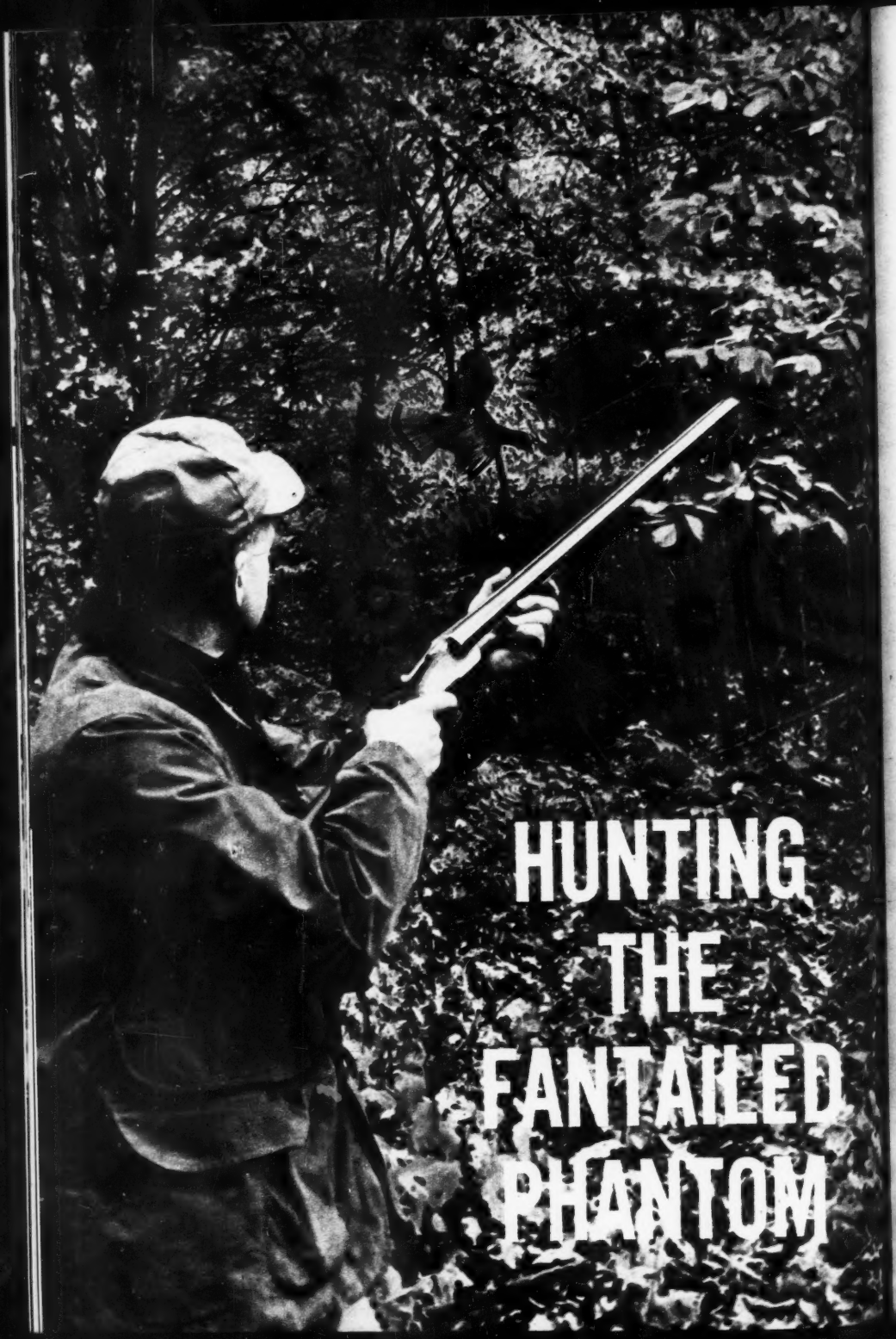
Prepared for the worst, Bril planted a .38 between two tables in his room. If the stranger tried one false move, Bril would see to it that he'd be deader than a cold fish. But the stranger came unarmed. He was calm, talked fast and spilled the solution to the case Bril was working on.

Within seconds Bril passed the information on to the attorney-general who quickly had the killer picked up. "How that guy ever knew I was on the case," said Bril, "is a mystery to me."

Thus, within ten minutes from the time Bril arrived at his hotel he had solved the crime. In another five minutes he was packed and on his way to the station. By the end of the day, Bril was at his desk ready to take on the next case in his fabulous career as a scientific detector of deception. •

Surrounded by electronic gadgets, Bril checks the TeleMagnet, his mechanical secretary which answers the phone and records urgent messages.

Bril's lie-detector test indicated that this convicted rapist was innocent. Later he was completely cleared of the charges and released from jail.


HUNTING
THE
FANTAILED
PHANTOM

Think you're a good shot? The grouse has stolen the self-confidence of more sharpshooters than any other American game bird.

By Raymond R. Camp
Rod and Gun Editor, N. Y. Times

IF the pheasant, quail and woodcock shooters can be classed as enthusiasts, then there is only one term left to describe a grouse shooter—a fanatic. The only reason why one of these specialists considers hunting any other upland game bird is that he finds it impossible to hunt grouse.

There must be some reason why the grouse shooter is so completely sold on this bird. The hungarian partridge is faster in flight, the pheasant is larger, the woodcock is trickier, the quail is tastier. Why is it then that these particular shooters should be partial to the point of fanaticism? An old man, who had hunted these birds through a dozen states for more than 50 years once told me:

"The ruffed grouse is the smartest, most unpredictable and challenging bird that ever grew feathers.

That may be why the man with the good grouse dog is the envy of his fellows, and there is a chance that it may explain why there are so few good grouse dogs. Any bird that can deceive a hunter so consistently and make him like it can make the average bird dog run in befuddled circles.

With other upland game birds you always see more than you shoot, but here again the grouse reverses the procedure; you hear more grouse than you ever see and you shoot at more than you hit.

I think back and consider how many good grouse dogs I have hunted over in my entire pursuit of this bird, and the conclusion is there were only three: two setters and one pointer. And one of the setters, strangely enough, was an Irish—a breed that has fallen into disrepute as a field dog in recent years.

Hugh MacCullum, now busily beating the Heavenly covers, had an old Irish setter that, for many years, I believed had been named after its master. It was only by accident that I learned that the dog's name was not Hugh, but You. Old You seemed to be able to think like a grouse. Take him into the ragged growth of an old abandoned

Above is the culprit who is the cause of frustration among our bird hunters. Below, a retriever is necessary to find cripples even if you shoot accurately enough not to need a dog that points.

An exceptionally good bag for a day's grouse shooting. And we can't blame the dog for chewing the head off a bird. He's done his job well.

farm and he would look the terrain over like a surveyor. Then he would cover certain areas but inevitably those would be the areas where the grouse were hiding. He moved fast and wide, which also was unusual in one of this breed, but he never outran his nose and when he caught the first whiff of a grouse he crouched and began walking on eggs. When he finally froze on point you never had to wonder whether or not the bird was there. If you hurried up carelessly and flushed the bird out of gunshot, You would turn his head slowly, regard you for a few seconds, then flash off in search of another bird. I know of only one occasion when You failed to retrieve a dead or wounded grouse and that particular bird dropped into a brook and floated downstream for more than 200 yards to be recovered later by sheer accident. Hugh, in speaking of the dog's ability, was resigned;

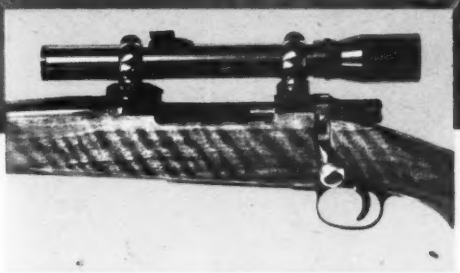
"A man, if he's really lucky, gets one good grouse dog in his entire lifetime. I've handled more than a thousand dogs in my day, but You is the only one who turned out to be a real grouse dog. I love grouse shooting above all other hunting, but when You is finished, so am I."

Whenever you find him, whether in an old, deserted orchard, a clump of birches, a grove of beeches or the rim of a spruce woods, the grouse will test your eye and skill. If there is any possibility of putting a tree between himself and the gun, leave it to the grouse. Many a good wing shot has sent a load of No. 8's into a tree trunk where a grouse was only an instant before. The bird may, after flushing wild, scale down to the ground and merge instantly with the carpet of leaves. Or he may, for no apparent reason, settle into the branches of a tree, then sit there watching you approach until you are almost within gunshot. Too often, convinced you have marked one down, you arrive at the spot only to hear him roar off with a thunder of wings behind you.

Unlike the quail and woodcock, the grouse can be hunted without a dog with reasonable success and many a grouse addict would rather walk up his birds with a retriever at heel than shoot over an inferior dog. Unless you have unusually fine vision, can mark down a bird accurately, are shooting in fairly open cover and have considerable experience, you will find a retriever essential to grouse shooting. Only last fall I flushed a bird, made a lucky shot and saw it drop in a burst of feathers. I spent 20 minutes combing the spot where I was certain the bird fell, but could not find it. My friend came up with a retriever just as I had given up in despair and the dog recovered the grouse in a half minute. I found I had passed within ten feet of the bird at least a dozen times.

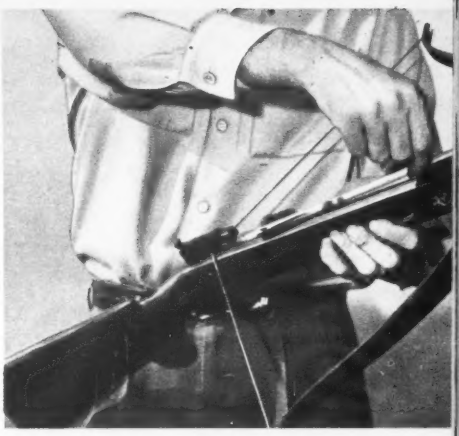
If you do happen to have a good dog to shoot over, there is no reason to be lulled into the belief that more than half of your problems are solved. You still have to hit the grouse and only the grouse knows in what direction he will decide to fly when he jumps. When you come to a halt behind the pointing dog, be ready to pivot in either direction and have your gun at the ready, for you are going to be in for some fast shooting and perhaps faster foot work. The bird may fly straight at you, in any direction ahead, or it [*Continued on page* 166]

NEW for the SPORTSMAN



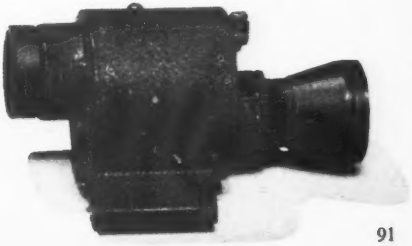
Left-Handed Rifle for left-handed shooters is not a conversion but specially manufactured. Bolt, safety and cheek piece are on left side. Comes in .30-'06 and .270. E. C. Bishop, Warsaw, Mo.

Crossbow shoots a feathered arrow by a tempered steel spring with a 125-lb. pull. It has sear release, will knock over a deer or bear and is accurate up to 150 yards. Schmid and Co., Los Angeles.



Folda-Fairway for dubs or experts will keep your game from becoming rusty. Hit a real golf ball and gadget registers hook, slice or fairway. It even tells you your drive distance. Can be used indoors, too. Peterson Mfg. Co., Glendale, Calif.

Boon To Hunters is the Boone Gunscope, a 2¾-inch 2¼x rifle telescope. Secret is a mirror optical system. Fits almost all guns including top ejectors. Fits in pocket, mounts' in two secs. Tinsley Laboratories, Berkeley, Calif.



Garage-O-Mat owner Ray Woolley gives a little vocal and manual advice to a lady customer who is installing a new engine in her family automobile.

I Run a Help-Yourself Garage

All you have to do is furnish the car and the labor—Ray Woolley provides everything else.

By Ray Woolley

Large sign over counter indicates the graduated scale of costs. Customers can work as much as a 14-hour day at Woolley's for as little as $2.50.

LOTS of people are wary of garages. The average person has no way of judging a mechanic—put a couple of tools in a man's hands, a little grease on his pants and for all you know he can have one day's experience or 15 years.

This situation was largely responsible for my idea to start a self-service garage—something like a laundromat where the customer furnishes the labor and someone else the equipment. The more I thought of the idea the better I liked it. This garage would have everything a customer, working on his own car, would need—parts, tools and all the equipment the average car owner can't afford to buy just to use once or twice.

I had been operating an engine-rebuilding plant and my friends always wanted to work on their cars at my place. They used my tools and it was handy to have me help them if they got stuck. That was how I started thinking of carrying out my plan.

In a large city, I figured, an apartment house area would be the best location. As I was going to be paid for space, I rented the largest building available in the area selected. It took six weeks to get it ready for business. We cleaned, painted and marked the floor into 22 rental stalls. Two chain-hoists were installed on tracks that ran the length of the building making them available to every stall.

Then came the problem of setting fees. In almost every other kind of business, someone ahead of you has already set prices, but as my self-service garage was the first one of its kind, we had to start from scratch. We finally decided to charge $1 for one hour's rental, $1.50 for two hours and from there a rate increase of 25c per hour until a maximum of $2.50 is reached for an all day rental. So, you can work a 14-hour day for the $2.50 rental. The garage is open Monday through Saturday from 8 a.m. until 10 p.m. and Sunday from 8 a.m. until 5 p.m.

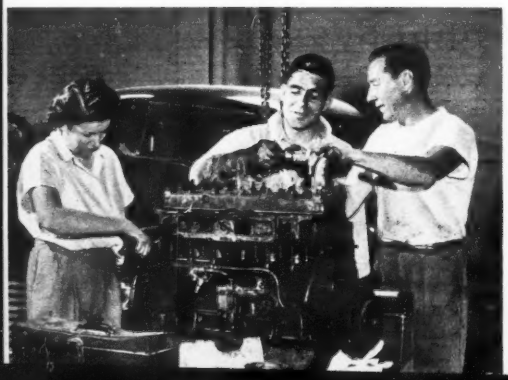
Each rental space is equipped with floor jacks, stands for cars, a movable workbench with vise and a tray for washing parts. If the customer does not have his

Woolley figured that the best location for his garage would be in an apartment-house area where there were many cars and not enough garages to take care of them.

Garage is light and airy with chain hoists on tracks which run the length of the building, making them available to each of the 22 stalls.

Husband-and-wife team of customers sign rental card and check out tray of tools from Mrs. Woolley who handles all the garage's paper work.

Hubby receives assistance in torquing the head bolts from one of Woolley's trained mechanics while his wife is busy tightening the clutch plate.



own tools he can rent a tray containing approximately $60 worth of tools for $1 per day. These tools will handle any ordinary job on a car and are checked in and out each day.

Like any well equipped garage we have many other services for the convenience of our customers—a complete machine shop for partial or full engine rebuilding; a steam cleaner for both chassis and engines; hot tanks for washing engines; clutch, brake and welding equipment; and complete electrical motor testing equipment.

An extensive parts department is maintained which stocks both new and rebuilt items. Take a fellow who wants to put in a new clutch—before he starts he buys the parts that he thinks he will need. After the car is torn down, he discovers that he needs more parts than he thought. Well, I have them.

Technical manuals are available for most cars and either I or one of my trained mechanics will give assistance or advice without charge. It isn't uncommon to spend 30 minutes at a time with a customer.

With our 22 rental stalls we average about 400 cars a month. In the last few months we've never had a day when less than half of the stalls have been rented. Saturdays and Sundays are our busiest days—one Saturday morning six customers were waiting in line for us to open.

We get all kinds of customers—16-year-old youngsters and up. Once a man about 75 years old came in and installed a timing chain in a 1938 Pontiac without any trouble. When I asked him if he was a mechanic, he said, "Well, I've fooled around a little but this is the first major operation I have ever attempted. Never had the tools before."

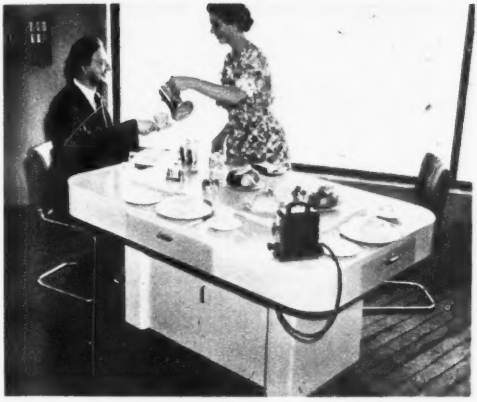
About 50 per cent of our customers are not mechanics yet they are pretty sharp. I've noticed it takes the average person about eight hours to do a job a professional mechanic can do in six.

You wouldn't ordinarily think a handicapped person would try to work on his car. However, a one-armed man once ground the valves on his own car. The only thing we did was help him adjust the tappets.

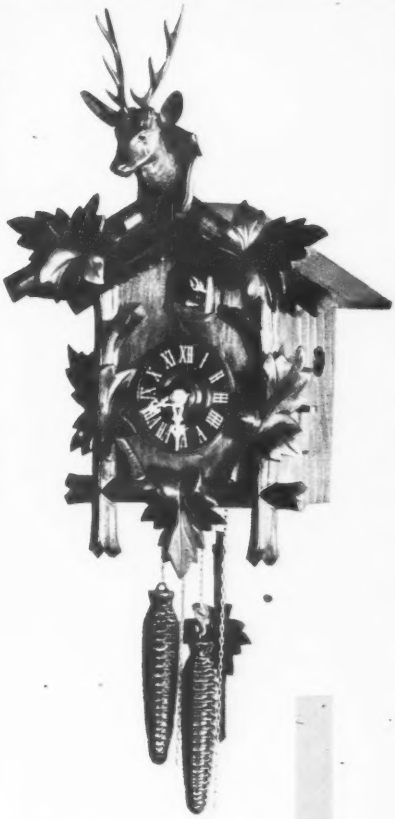
Many of our customers are man and wife. Often the wife will come in and do some work during the day and hubby will do the heavy work in the evening. One couple took an old V-8 apart to install new bearings while a baby sitter kept the family heir happy at home.

Another couple, consisting of a mother and son, installed a new engine in the family Hudson. The mother did a lot of work during the [*Continued on page* 162]

NEW for the HOME

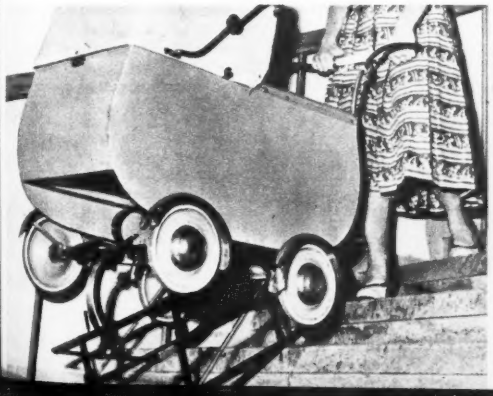


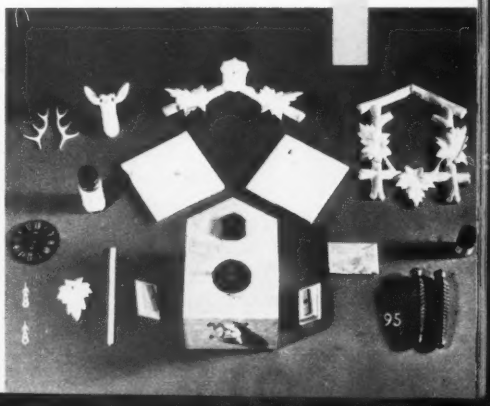
Refrigerator-Table is Australia's contribution to the modern kitchen. Lids lift in plastic top exposing chilling compartments. Freezing unit and trays are underneath. Price, in Australia, is $338.



Cookoo Kit contains all the carvings, works and parts imported from Germany's Black Forest. Build it yourself. Kit form lowers imports duties and taxes. J. F. Reich, Quivira Lake, Kansas City, Kan.

Stair Coaster made in Sweden takes the bumps from the steps when Junior's carriage goes downstairs. Special sled-like runners do the trick. Carriage rolls on frame, backs off. For non-slippery steps.





America's Spooks

Gentle ghost of Evelyn Byrd haunts the gardens and lanes of Westover plantation in Virginia. This lovely bit of ectoplasm is eternally grieving over her lover, lost a long time ago.

Who says there are no ghosts? Listen to these stories of leering specters and screams in the night and you'll realize that this country's a lot more haunted than you think.

By Leslie Dayton

COME along on a Spooks' Tour of America. You really don't have to head for England to be frightened silly by ancestral specters—there's a fine crop of haunted houses, churches, prisons and caves, right here in this country. You'll find an awesome array of spectral images leering from darkened windows, chains that clink in the dead of night, raps that come from nowhere and terrifying screams that shatter the midnight stillness.

Meet, for instance, the spook that drove residents of the flourishing little town of Sulphur Springs, Tex., half crazy with his shenanigans just a while ago. This one was a spook, not a ghost. And there's a difference, too, or didn't you know? A ghost, according to experts in psychical phenomena, is a returned deceased person who usually appears at specific locations while a spook is never identified as a specific individual and pops up in any number of unsuspected places. Anyway. . .

One hot July night a farmer who went into his kitchen for a drink of water found himself face to face with a tall, albino-like creature covered by a misty-white substance from which shone two fiery eyes. As he stared, it simply faded through the wall and disappeared. Not long after, a beautiful young girl encountered the spook near a moldy haystack. She fell to her knees and hysterically implored him, or it, not to harm her. The spook just laughed hollowly and left.

That launched the biggest spook hunt that part of the country had ever seen. Bands of residents, armed to the teeth, roamed through the summer nights, but the capricious Man in White materialized and vanished before their eyes. Once a man shot off his sister-in-law's nose because she appeared in a window wearing a long white nightgown. Mob fear dominated the countryside and alarmed police ordered the people to lay aside their arms, but few obeyed.

Well, the spook never revealed his mission. He never harmed anyone, just came and went. Then, at the close of summer, he disappeared for good. Nobody ever saw him again, but he left an impression that Sulphur Springs will never forget.

This weird tale is just partial proof of the fact that America has its share of ghosts. There are more than 1,000 haunted houses in Louisiana alone, mostly in the eerie, winding streets of the New Orleans

Ghost in the White House? Carpenters who worked on the recent renovation of this famous home of presidents watched anxiously for the legendary specter.

Upper window of Carrollton, Ala., courthouse, above right, is home of one of America's most famous ghosts—the frightened image of Henry Wells on the lower right pane, artist's sketch above left.

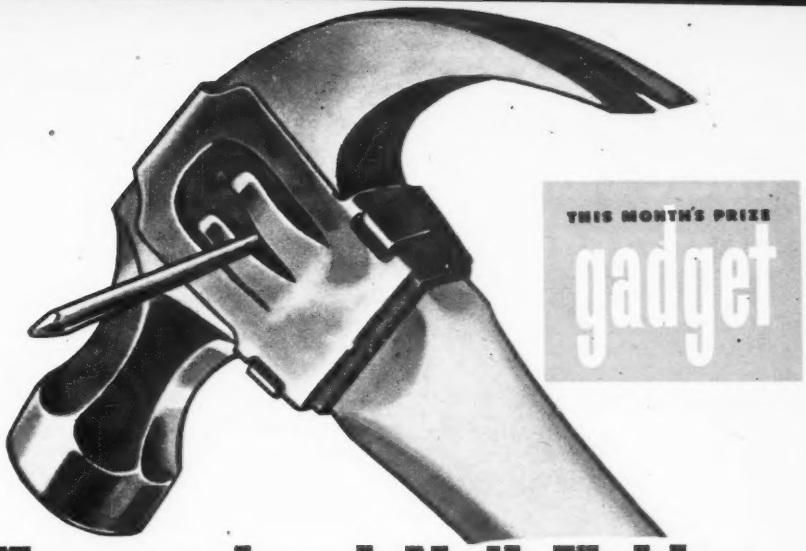
French Quarter. Dotted along the lonely back roads of New York State, between the Hudson River and Buffalo, are hundreds of places where spectral shades are said to walk by night. So numerous are the strange, unexplained visitations that one main road passing through an unusually well-haunted area has been dubbed "psychic highway." The Southwest and West Coast are sprinkled with places where restless spirits allegedly roam. In fact, the files of the American Society for Psychical Research are heavily stocked with cases of spectral goings-on which cannot be attributed to earthly reasons.

Just last Spring a motorist driving across the Mid-Hudson Bridge in New York at twilight saw three construction workers, shadowy figures, high up on the span. Beside them was the form of a large cat. A few miles farther on, the motorist stopped at an inn and mentioned the fact that he had seen three men at work on the bridge.

"Pretty late for them to be up, isn't it?" he asked.

The proprietor shocked him with this reply: "Those aren't men. Those *were* men. Now they're [*Continued on page* 170]

Widow of the late magician Harry Houdini attempted to communicate with her famous husband on roof of a Hollywood hotel but the ghost of honor never quite managed to put in an appearance.



Hammerhead Nail Holder

"CARPENTERS need three hands," the father of A. M. Spors used to say as he went about his job of contracting and building. "One hand to hold the board, one to hold the nail and the third hand to use the hammer."

Young Spors, working for his father, listened to him carefully and the remark remained in his memory. But it wasn't until many years later when Spors himself was in the contracting business, that the idea for an actual hammer nail clip was finally formed. After much trial and error, he came up with a very simple gimmick. Easy to attach to any hammerhead, it requires no screws or special tools. You just follow a set of easy instructions.

There's a clip for nails on either side of the hammer so that it can be used by left or right-handed craftsmen without any changes at all.

And what do you think young Spors decided to call his clip? Why, the Third Hand, of course!

For dreaming up, designing and finally manufacturing this third-hand gadget, MI presents A. M. Spors with a strictly first-hand $50 Prize Gadget Award. •

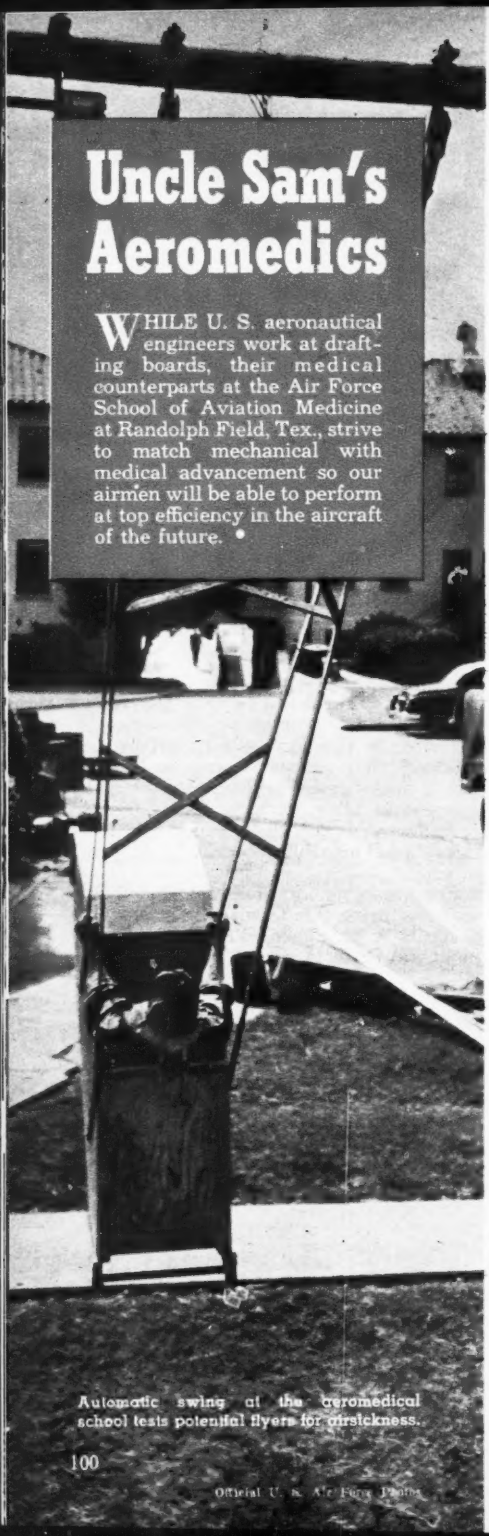
WIN $50

Dreamed up a neat gadget? If you're pretty keen about that pet project of yours, get busy and work it out in your shop. Then send pictures and a description of your invention to the Gadget Editor, Mechanix Illustrated, 67 West 44th Street, New York 18, N. Y. Each month the best entry will be given a cash prize of $50.

Inventor A. M. Spors, below right, checks measurements on one of his hammerhead attachments. This gadget, which Amsco Co., LeCenter, Minn., sells for 50c, makes scaffolding an easy job, below left.

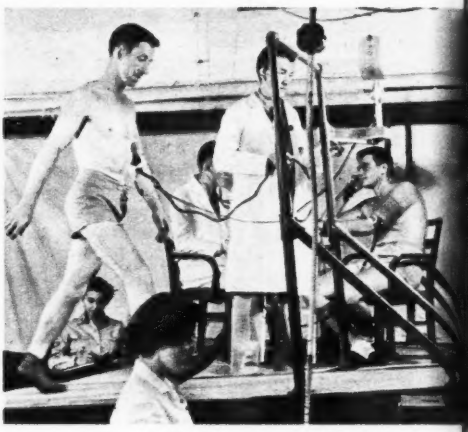
Uncle Sam's Aeromedics

WHILE U. S. aeronautical engineers work at drafting boards, their medical counterparts at the Air Force School of Aviation Medicine at Randolph Field, Tex., strive to match mechanical with medical advancement so our airmen will be able to perform at top efficiency in the aircraft of the future. •



Automatic swing at the aeromedical school tests potential flyers for airsickness.

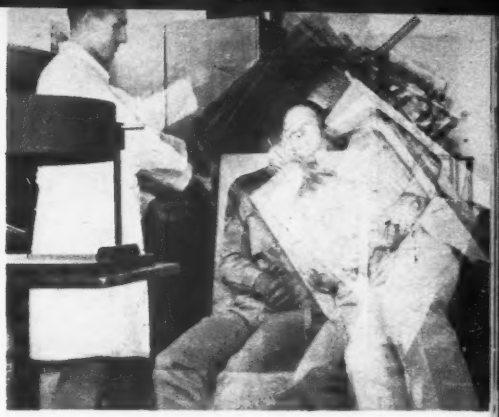
Guinea-pig soldier takes mixture of drugs before riding on swing in test for airsickness relief.



Treadmill is used to test causes of anxiety—heartbeat and blood of subject are checked for clues.

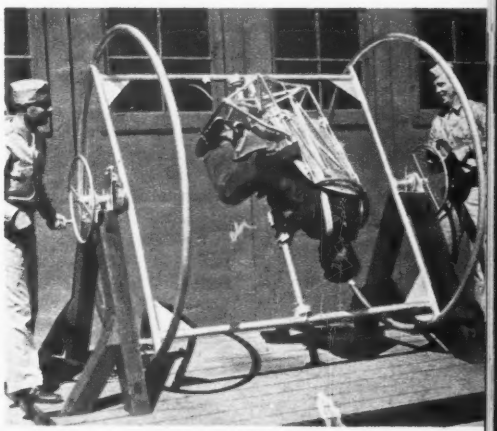
Pumping ethylene-oxide into shoe-filled sealed section of inner tube kills athlete's foot fungus.

Official U. S. Air Force Photo



Tilting chair experiment tries to prove the theory that if a pilot's head is turned to a different angle—to change illumination of retina—his vision while night-flying is substantially sharpened.

Baby, it's cold inside! In the Arctic room of aeromedical school, airmen test new survival clothing.



Balance-testing machine checks pilot's ability to adapt himself to constantly changing positions.

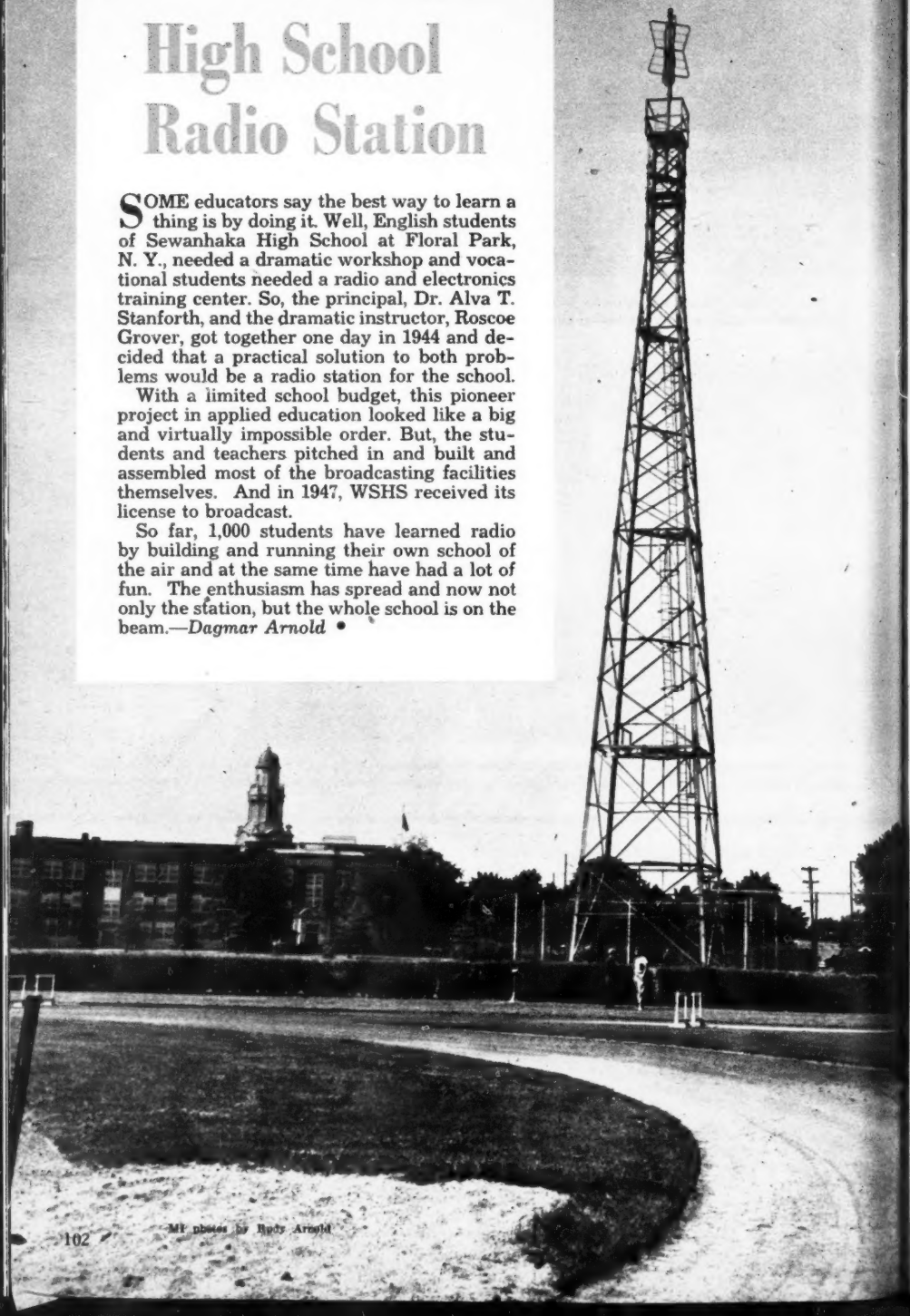
High-altitude pressure chamber, left, simulates cabin at 40,000 feet. At right, aeromedics test oximeter which prevents oxygen shortage and photo-electric warning device which reveals change in blood color.

High School Radio Station

SOME educators say the best way to learn a thing is by doing it. Well, English students of Sewanhaka High School at Floral Park, N. Y., needed a dramatic workshop and vocational students needed a radio and electronics training center. So, the principal, Dr. Alva T. Stanforth, and the dramatic instructor, Roscoe Grover, got together one day in 1944 and decided that a practical solution to both problems would be a radio station for the school.

With a limited school budget, this pioneer project in applied education looked like a big and virtually impossible order. But, the students and teachers pitched in and built and assembled most of the broadcasting facilities themselves. And in 1947, WSHS received its license to broadcast.

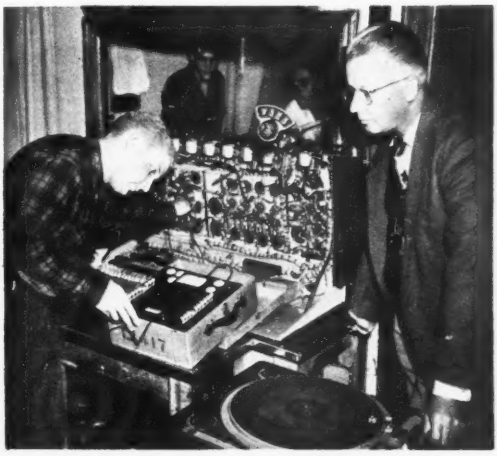
So far, 1,000 students have learned radio by building and running their own school of the air and at the same time have had a lot of fun. The enthusiasm has spread and now not only the station, but the whole school is on the beam.—*Dagmar Arnold* •



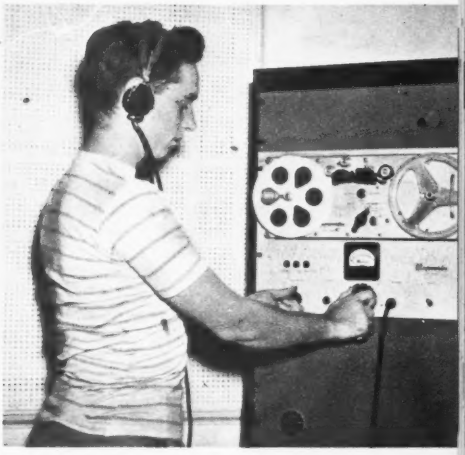
MF photos by Rudy Arnold

Broadcasting studio of the school station was a four-room home till the pupils converted it into a compact but modern radio headquarters.

Student-disc jockey William Forbes takes his turn at the control consolette for a recorded program of dance music during the station's daytime schedule.



Student Joseph Newman, left, checks consolette in the kitchen-control room of station WSHS as teacher-radio operator, right, supervises the job.



Senior Robert Dougherty makes a tape recording of WSHS-FM program at a recorder located in the former dining room of the converted studio-house.

Three seniors air their views on a roundtable discussion broadcast from the main studio. Behind glass panel at left is broadcasting control room.

What's New At The Met, a typical Sewanhaka show broadcast from the auditorium, presented local trio, center, as well as Opera Guild officials.

hobby

HALL OF FAME

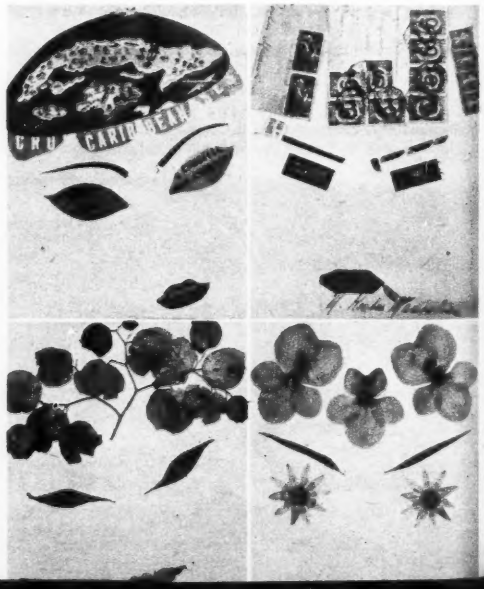
ROUBEN MAMOULIAN paints portraits with posies

"SAY It With Flowers" is a popular flower-industry slogan. But famed stage and screen director Rouben Mamoulian says it with flowers in a novel manner. He presents the flowers to the lady of his heart in the form of her portrait. Just to keep the record straight, the lady of his heart happens to be Mrs. Mamoulian.

For many years Mamoulian has been spending his spare time at his hobby of collecting rock fragments and pressed flowers. Because his wife is a portrait painter, it was natural enough that he should begin experimenting with pressed-flower portraits with her as his model.

The photos in the lower right show some of the results. As you can see, flushed with his success, he has branched out and now also does portraits of his wife in shells, travel folders and even postage stamps. •

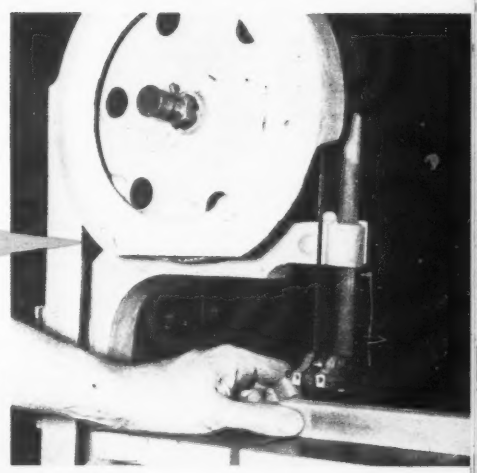
Artist Mamoulian looks over his masterpieces, below left, which include portraits in travel folders, stamps, leaves and flowers, below right.

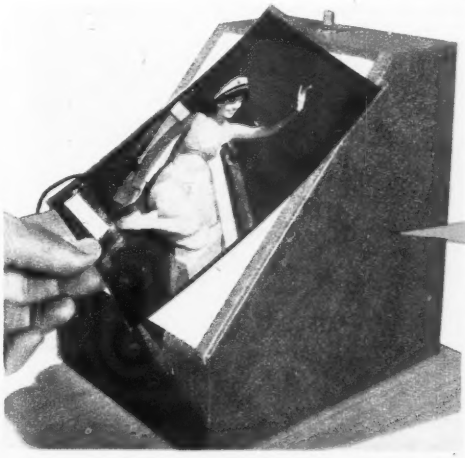


mi crafts and hobbies

MI Sportster. Turn the page for complete plans for building our custom $500 sports car. It will do 100 mph with a hopped-up V-8.

Metal Can be Cut with your woodworking band saw if you reduce speed and use proper blade. See page 144 for instructions.





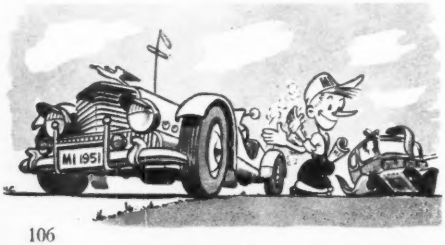
Viewer for negatives and color transparencies doubles as a stand for retouching. Make it for less than $2. See page 150 for details.

Rustic Shutters will help to personalize that house or cottage of yours in the country. The story on making them begins on page 124.

The MI Sportster

Bob Whitehead at the wheel of the MI Sportster. The car features a low center of gravity with uniform weight distribution. Body has been especially designed to eliminate need for die or hammer work on the sheet metal. Photo below shows type of Ford used for conversion.

Photos by Robert Brightman



By R. E. Whitehead

Why envy the owner of a snazzy sports car? You can build one yourself with these complete instructions and plans for less than $500. It will do better than 100 mph.

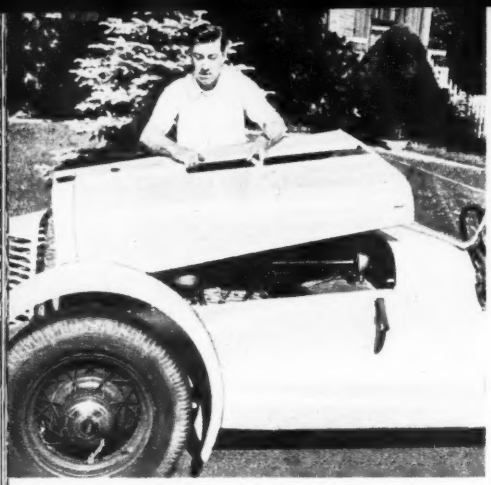
The curves in the grill were obtained by bending tubing around the rim of 16 in. wheel. The headlights consist of a standard sealed beam lamp conversion kit.

DELAGE, Jaguar, MG, AC, Aston Martin, Nash Healy, Lagonda, Simca, Jowett Javelin Jupiter (there's a mouthful!) Riley, Bentley—fabulous sports cars, but all running in the neighborhood of $1,900 to $14,000. But how about a real sports car that will not only cost you less than $400 but will actually show its heels to many of the above buggies? The answer is the MI Sportster. The secret is its weight to power ratio. It tips the scale just below the thousand-pound mark. A light but strong framework made of electrical conduit tubing makes the light weight possible while a standard Ford engine equipped with 8.5-1 heads with a dual manifold accounts for its amazing pickup and power. Let's begin!

Chassis. The chassis for the MI Sportster is a 1932 Ford. Try to get the two-door sedan as the seating arrangement utilizes independent bottom cushions which are available in this model. This chassis permits the installation of a low floor board; it is a light and strong frame and will take any Ford or Mercury motor up to 1948. The 1949 and later motors require welded plates on rails for front motor mounts.

The first step is to strip the chassis of body, fenders and radiator. Don't damage or junk any material as some of the parts will be used later. Check the motor, steering and running gear for wear or damage and repair or replace where necessary. We now have the bare chassis intact with motor, transmission, differential, gas tank

MI Editor Bill Parker has no difficulty at all in touching the ground while in the driver's seat. The car has excellent cornering ability.

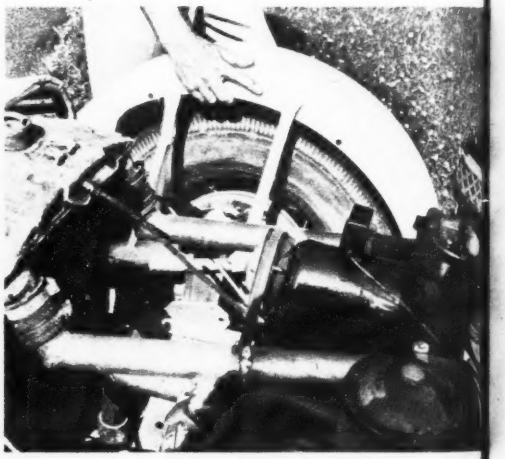


Inasmuch as the hood of the MI Sportster is made of sheet aluminum, it is light in weight. It can be quickly removed by unbuckling four leather straps.

For those who enjoy complete open air motoring, the Plexiglas windshield can be quickly detached by removing single stove bolt in the center.

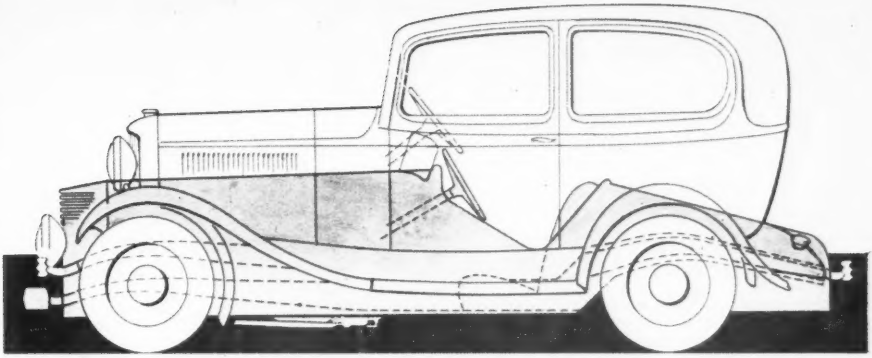
The fenders, despite their custom appearance, are standard trailer units available from Montgomery Ward. Rear deck is top of 1939 Plymouth.

The bracing for the front fenders consists of the same type of tubing used for the body. Tubing is brazed to body frame first and then to fenders.

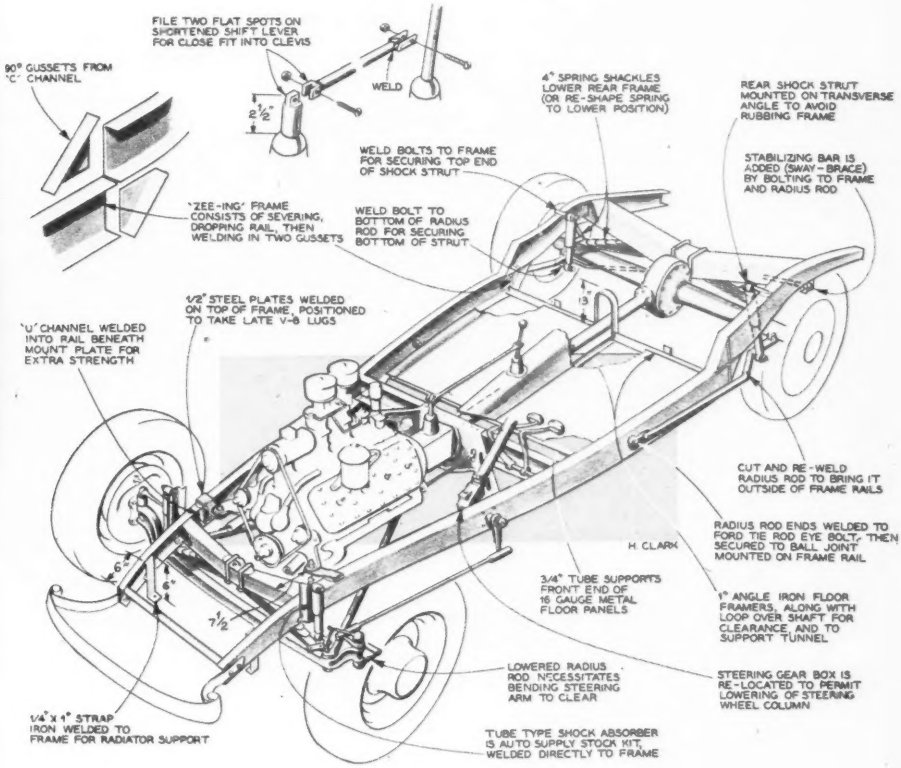


and wheels. If the builder is contemplating a hopped up motor, now would be an opportune time to make this change. The design of the MI Sportster calls for a low center of gravity and to achieve this there are two major changes to be made to chassis. Installation of a front dropped axle and Z-ing the frame at the rear. A dropped axle can be obtained from a speed shop. After the reforged axle is installed it will be necessary to bend the steering arms to permit the tie rod to clear the radius rods. Bend these arms without disturbing the angle of the ball joints.

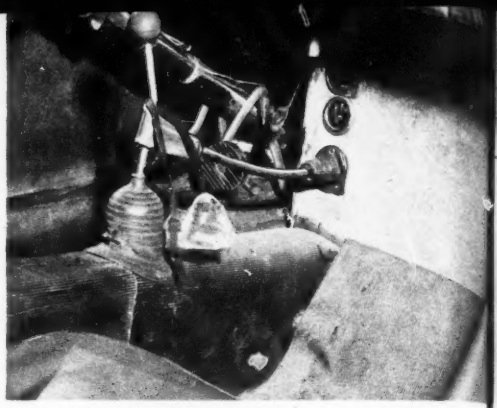
If mechanical brakes are to be used the brake lever posts will have to be cut and a section of rod welded in place to elevate the shaft to the proper level. The rear spring shackles will have to be replaced with 4-in. shackles. The same lowering effect can be obtained by having the spring reshaped by a shop. Shock absorbers are a must. The front can use the Ford or tube type but in the rear it will be necessary to use the tube type. The front shocks are mounted in a vertical position and at rear are on a slight angle in order to prevent them from rubbing the frame.



WHEELBASE UNCHANGED, FRAME DROPPED, NEW BODY, AND 1932 FORD BECOMES 1951 SPORTSTER

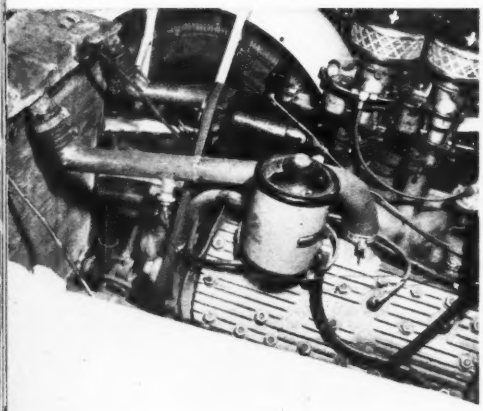


A storage compartment behind the seat back provides sufficient room for luggage and tools. The two uprights also serve to support the floor board.

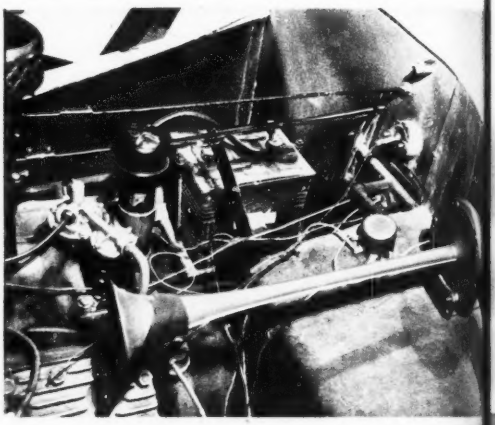


To shift gears, the vertical bar is moved conventionally. This bar transmits the movement to the horizontal lever which leads to the transmission.

Radiator is completely clear of the grill. It is secured by brazing rods to the shell and bolting the opposite ends to the frame. Note dual carbs.



The hood of the car can be removed as a complete unit which means maximum accessibility to the motor compartment. Note parking brake extension.

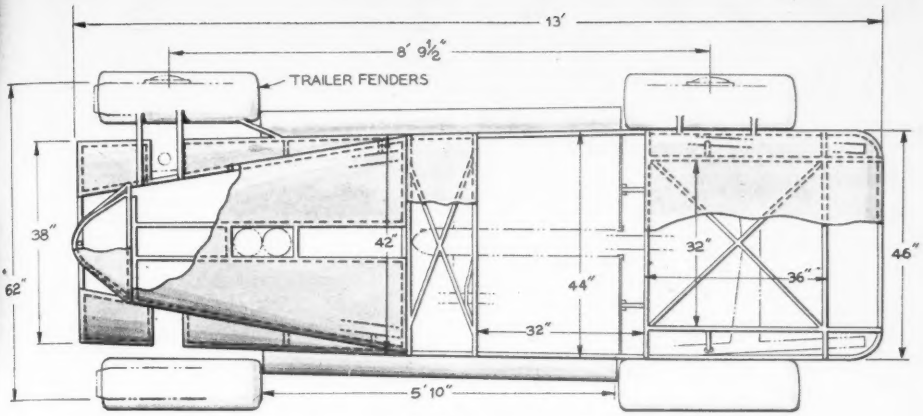


With the long shackles an anti-sway bar should be installed. This is another item supplied by speed shops or can be found in an auto junk yard. Late model Fords are equipped with these bars.

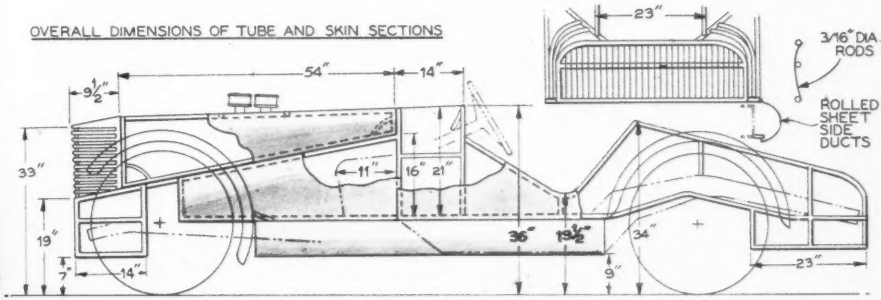
We are now ready to Z the frame. First place jacks under each rail near the middle of the car and remove the rear brake rods. Block up the rear frame section and remove the spring shackles. Cut to shape and weld to rails as shown on drawing. As the floor board is to be installed on bottom of rails, it is obvious the rear radius rod will have to be relocated. Jack up differential and remove both wheels. Remove bolt holding the radius rod to the drive shaft housing. Heat the radius rods 2½ in. from axle housing and slowly bend outward approximately 45°. Don't force the bending process as too much torque may effect the rear end alignment. Ford tie rod ball joints are used for securing radius rods to frame rails. Hold the ball joint against the end of radius rod and mark on the rail where hole is to be cut. Holder for ball joint shank can be cut from a matching steering arm or from a suitable nut. Heat red hot and open up with a tapered punch. Cut hole in rail for holders and weld in place. Next insert joint in holder and then weld radius rod to arm of ball joint.

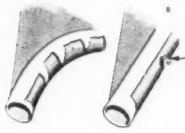
The next step is to provide hangers for radiator. Use 2x1/14 in. strap iron and install as shown in drawing. After hangers are installed mount the radiator and brace it by shaping the rods and running them to holes in the rails. This arrangement will make it possible to remove the radiator without disturbing the body or grill.

Floor boards. As the position of the drive

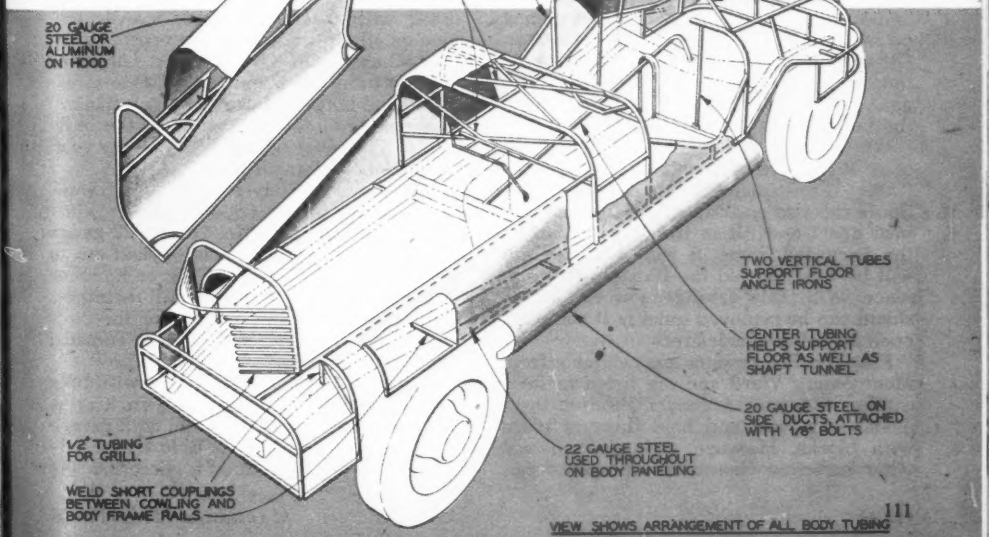


OVERALL DIMENSIONS OF TUBE AND SKIN SECTIONS

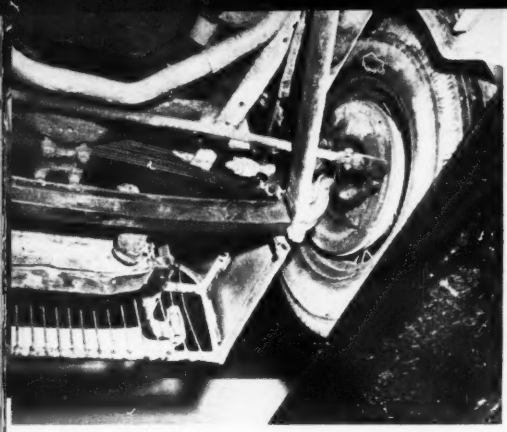




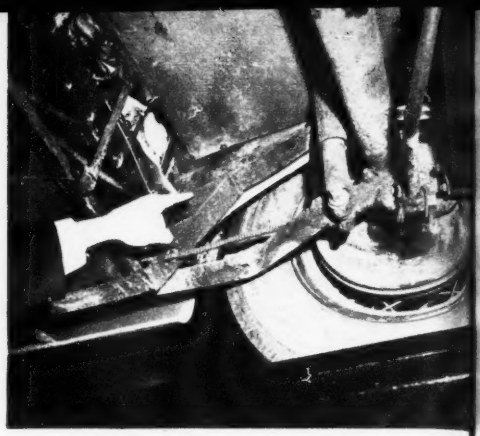
SKIN APPLICATIONS



VIEW SHOWS ARRANGEMENT OF ALL BODY TUBING



The stock front end of a 1932 Ford chassis is retained with the exception of a dropped axle. Steering arms were heated and then bent to position.



Auxiliary supports for the rails were obtained from an old car frame. They are welded into place. Shock and stabilizing bar mountings are also visible.

shaft prevents the installation of a floor board from one rail to the other, it is necessary to make it in two sections. The floor board is additionally supported by ½-in. standard pipe curved and welded to middle and rear frame cross members. For the floor board frame use 1-in. angle irons. Cover with No. 16 gauge sheet steel for bottom and 22 gauge for tunnel.

Brakes. The rods are replaced by 1937 Ford cable assemblies. As the flexible housing supplied with the cable is not of sufficient length, it will be necessary to provide an additional housing. A ⅛-in. standard pipe can be used for this purpose. See the drawing.

No doubt there has been some question as to where the battery will be located. In the original it was mounted on a steel plate just ahead of the firewall. If more leg room is desired for a passenger, the battery may be located on the frame along the motor. Other items such as starter relay and button, light switch, horn, mufflers, and gauges, can be located where desired by the builder.

Windshield. The frame is constructed out of a 1932 Ford windshield. Half of this frame is adequate for wind deflection. Space the two ends approximately a half-inch apart and fill in the V with part of the discarded frame. A wing bolt and nut will be used to hold the Plexiglas pane in place. With this arrangement the windshield can be removed quickly if complete open air driving is desired.

Fenders. The fenders are available from Montgomery Ward and are listed in their catalogue as trailer fenders. Position them over the wheels and hold them in place with blocks. Measure spring travel and allow sufficient clearance. At rear of car, bolt the ends directly to the body skin. Braces at top are ¾-in. conduit bolted or brazed in place. If bolts are used it is necessary to flatten the ends. Front fenders are bolted to ducts at lower ends.

Lights. The head lamps are revamped with a sealed beam change-over kit.

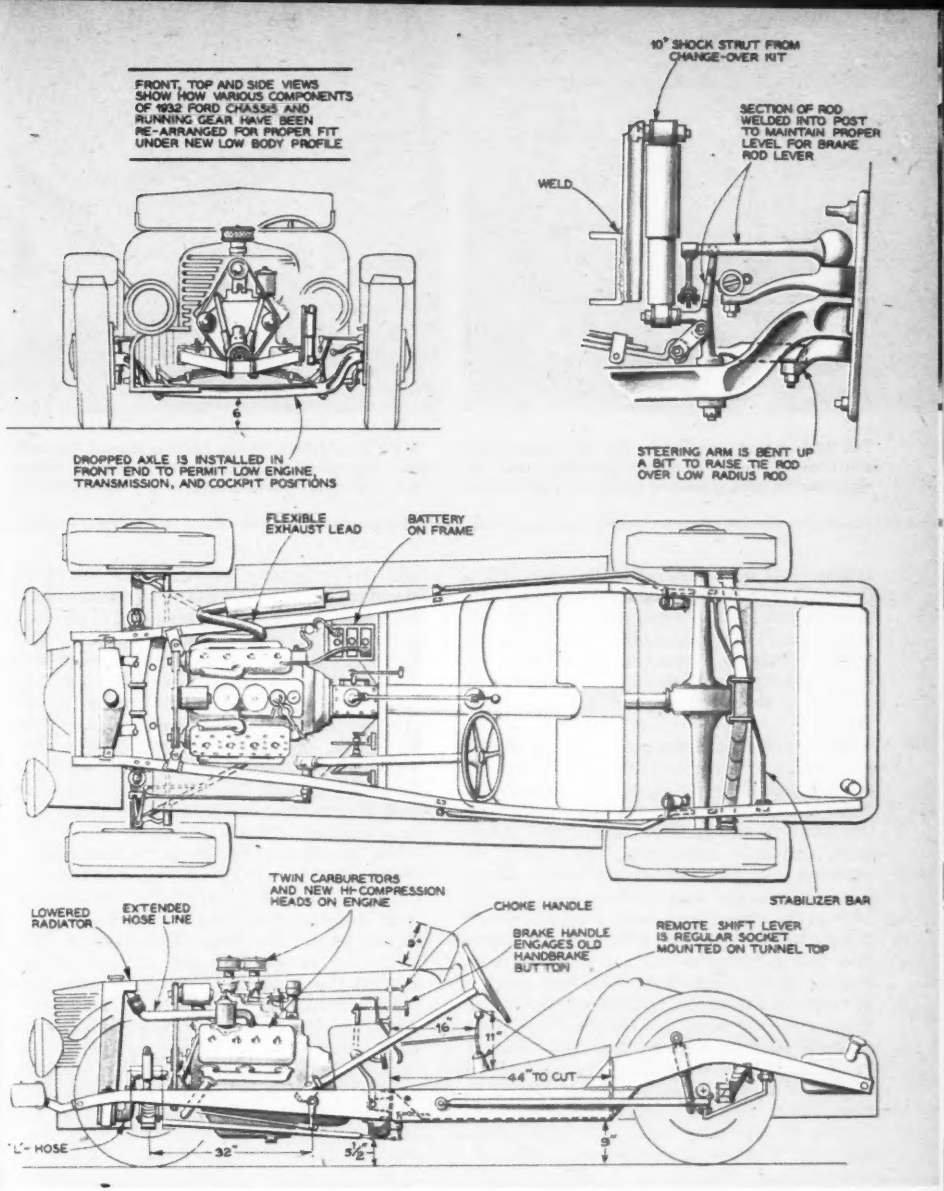
Upholstery. The covering material for seats, side panels, and cockpit padding is cloth-backed plastic. Price will vary from $1.00 to $4.00 a yard. Cut plastic to size, fold edges over and sew with appropriate padding in place. Use a ticket punch and space holes one inch apart. Mark off holes on body skin and drill. Padding is secured to skin with plastic covered electric lamp cord. Tie a knot in one end and lace cord back and forth through holes.

To cover sides of cockpit, use a piece of waterproof cardboard. Cut to fit, then cover with plastic. Fold edges over and glue on opposite side with waterproof glue. Place these sections in place and drill holes in body tubes for metal screws. One screw at top and bottom of each post is sufficient.

The selection of paint is up to the individual. The cover will give you a very good idea of the colors used.

Framing. The body consists of a framework of steel tubing (¾-in. electrical conduit) with a skin of No. 20 and 22 gauge sheet steel. The design was worked out to eliminate the necessity of die or hammer forming of any sections, but still maintains simple and compound curves for the purpose of providing strength and to enhance appearance.

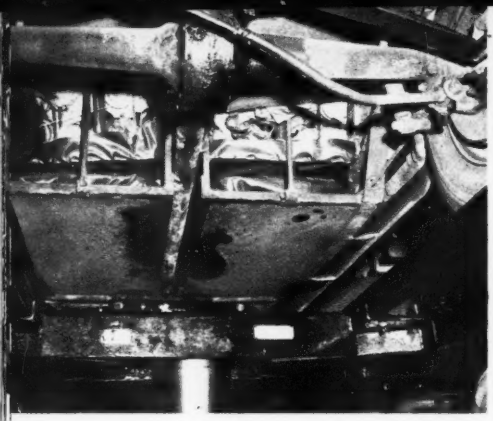
Place the car on a level surface with tires properly inflated. Take two 88½-in. lengths of tubing and lay out (parallel with garage floor) as shown on sketch. Before proceeding it will be advisable to describe the



method of bending the tubing. Select a cylinder, 12 in. in diameter to serve as a pattern on which to make the bends. Practically all the bends in the body are made to the same radius. Before each piece is ready to be bent, close one end with a hammer blow and fill with fine dry sand. Then close the opposite end and bend cold. The flattened ends are then cut off with hack saw and the sand removed. The cowl

LARGE-SCALE PLANS

will greatly simplify construction. Send $3 to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Connecticut. Please specify Plan No. HJ-19.



The floor board consists of No. 16 gauge steel plate on a frame of one-inch angle irons. At right can be seen mounting for one of rear shocks.

View from bottom of car looking toward the radiator. Note how bumper support arm passes through the grill work. Hand points to left splash guard.

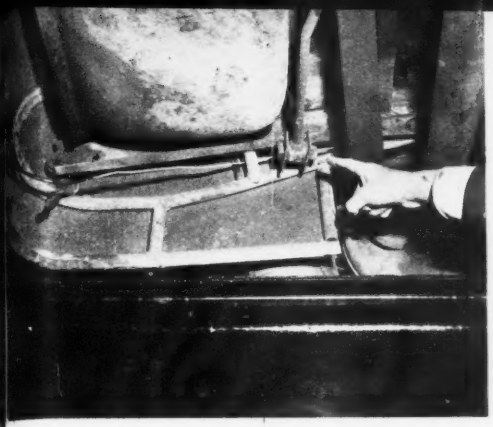
frame is 21 in. high and is laid out with a fire wall at the center chassis cross member. Rear of cowl is 13 in. from fire wall. Drawing shows the arrangement of various braces. If desired, one transverse brace of ¾ in. tubing installed 13 in. above chassis rail may be used instead of bracing as shown.

After the cowl framework is completed, bow the top frame to eliminate a flat surface when skin is applied. Be sure to have front and rear sections of frame identical in dimensions and shape. After cowl frame is completed, the change in steering box location will be made. Move box towards the rear of the car and cut a hole in the chassis rail for the pitman shaft. Next elevate steering wheel 17 in. above floor board (measurement to be taken from bottom of wheel to floor). Bottom section of rear deck frame is same elevation above ground as lowest part of chassis rails. Rear of deck is 4½ in. from gas tank. Before using the torch around rear of car, thoroughly steam out the gas tank and then keep filled with water. Tubes for cockpit cutaways are also bent over the 12-in. patterns. Bottom of cutaways are 3½ in. above chassis rails.

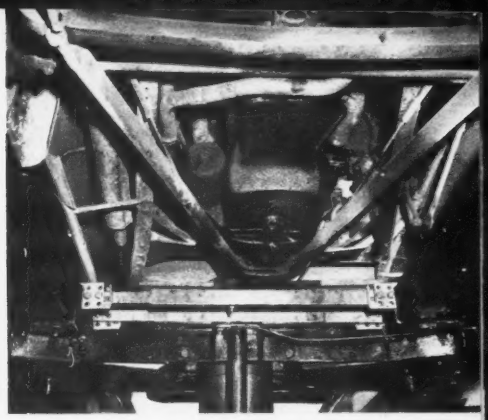
Next take two pieces of tubing each 63 in. long. Measure vertically 14 in. above body rails on front cowl posts and secure one end of tubing at this point. Extend these tubes down over chassis rails with opposite ends 18½ in. apart. Measure back 9½ in. from front of chassis rails and install 4 in. vertical post between each tube and top of chassis rail. Install a curved section of tube between this tubing and the end of body main rail. Refer to drawing for hood framework. Top lengthwise pieces are ¾-in tubing and balance is ⅛-in. standard iron pipe. Braze to underside of rear cowl frame and to the metal at the lock assembly on steering shaft housing. Remove ignition switch, otherwise heat will damage this part. Cut the drag link and weld in a section of rod to obtain the increase in length required. Unless the builder is capable of making a first class weld, welding should be performed by a qualified expert. Do not install the drag link at this time as it will interfere with construction of body frame.

We are now ready to start construction of the front or rear assemblies. For the sake of making a choice we will select the rear unit. Layout of tubing for deck frame is shown in the drawing. The front of deck is 1½ in. lower than top of cowl. When joining the various tubes make sure surfaces are flush and there are welding beads where sheet metal is to be applied. Otherwise it will cause an uneven surface on the skin. Tubing, can be joined by welding, brazing or bolting. Latter method involves cutting short piece of rod or pipe that will fit snugly into the tubing. Position bolts so that heads or nuts do not face the body skin.

Body. Before going into detail on applying the skin there are two items which will facilitate the work. Obtain two 3-in. C clamps. Cut a half-inch ring, ¾ in. long, from ¾-in. conduit. Open it up until it will fit the outside diameter of the conduit and braze to the stationary end of the C clamp. These clamps will be used to hold skin in place at various points while it is being shaped. A piece of 2-in. angle iron, 3 or 4 ft. long, will come in handy for holding the sheet metal firmly against frame-



The anchor for the anti-sway bar is welded to a rail. This bar is essential for maximum stability. Original location of the gas tank is not disturbed.



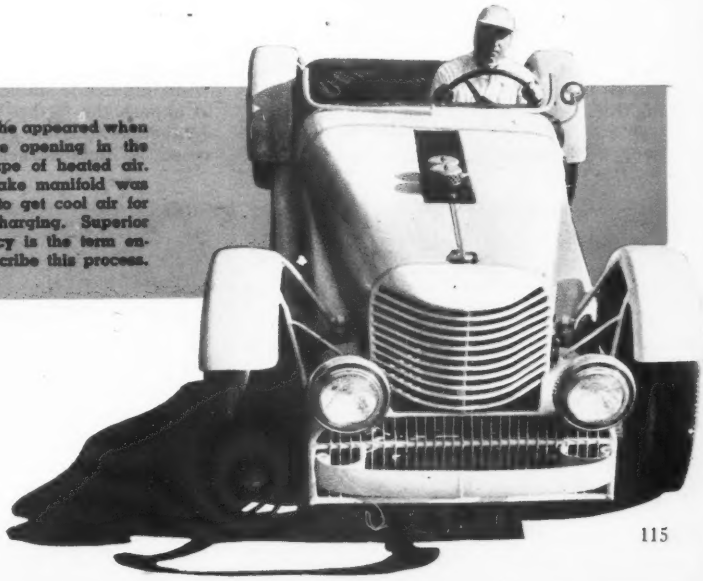
Here we see the method used by Mr. Whitehead to brace the body to the car frame. The tubing may be brazed or bolted. View is from front to rear.

work when hammering the edges around the conduit.

Use No. 20 gauge steel for the cowl covering. The balance of body is 22 gauge except for deck lid. Cut each section a bit larger than the frame. Start at center and secure with the clamps. As skin is installed, drill and bolt to tubing every 2 in. When main body rails are reached clamp the angle iron in place and then hammer the metal around the rail. Use a hack saw to cut surplus metal off flush with outside of tubing.

Next cut out a section of sheet metal for the front side panel. To start, slip the metal under the cowl skin just beyond the front cowl post and clamp in place. Have someone hold the metal against the main rail with a 2x4 and slowly start bending the skin to the frame from the bottom up. The final step is to bend the metal around the cowl post. Use pliers, as a hammer will dent the cowl skin. Next step is to apply skin to front side panels. For the top of radiator grill lay out piece of oversized metal on frame and start from the center shaping the skin outwards. After general shape is obtained allow sufficient metal to bend around tubing and cut off the balance. Next section to work is the cockpit sides.

The top deck is the only section of the body not made [*Continued on page* 181]



Bob Whitehead as he appeared when he visited ML. The opening in the hood permits escape of heated air. The high dual intake manifold was adapted in order to get cool air for better cylinder charging. Superior volumetric efficiency is the term engineers use to describe this process.

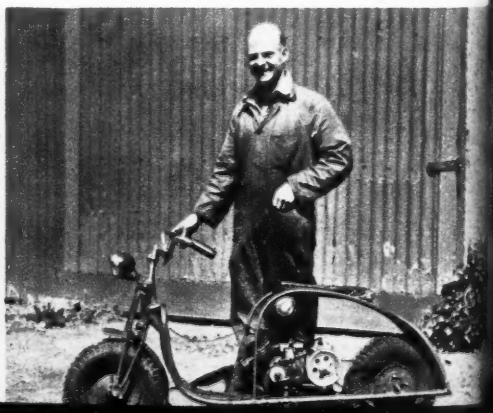
A first attempt at boatbuilding for Carl J. Stippich of Milwaukee resulted in this classy 13-ft. outboard utility racer. Powered by a 25-hp Mercury, the craft can do better than 45 mph. Engineer Stippich fashioned much of the hardware himself.

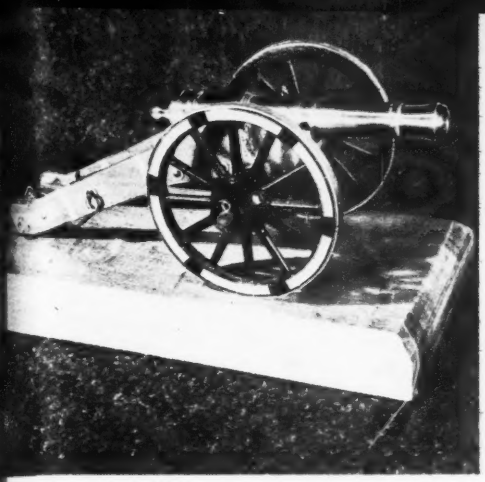
Kenneth Harlow, who hails from Ukiah, Ore., was impressed with plans of Dorena, a 26-ft. yacht, run in MI two years ago. His 1½-in.-per-ft. model follows the prototype exactly. Yellow pine was used primarily. Time required for completion: 600 hours.

WORKBENCH AWARD WINNERS

Triple-Tiered Table appeared as a project in MI last January. William J. Ryder, Staten Island, N. Y., built the unit, increasing thicknesses of the major shelves. Table was covered with prima vera plastic veneer, a procedure shown in a recent issue.

New Zealand reader Max Dayman constructed the framework of his scooter from ¾-in. pipe. Side shields have been removed to expose the ⅝-hp Villiers coupled to a 3-speed motorcycle gear box. Scooter's top speed: 35 mph. Makes 200 miles per gallon.





Spirit of '76. This 6-in. model of an authentic Revolutionary War field gun is the work of Robert H. Dalton of Roseville, Mich., who writes, "This is just one of my many pieces of miniature artillery. Lots of research pays off in accurate work."

Small frys' jeep was built by B. J. Maramonte of Milwaukee. It started out as a pedal-powered job, but B. J. intends a battery conversion just as soon as he can get around to it. Car is 56 by 25 in., weighs about 50 pounds and seats four children.

Each craftsman whose project is shown here receives a $5 check and a Workbench Award Certificate. How about sending us a photo and description of your latest project? If you aren't a winner, you may still receive a Certificate Of Merit. Photographs of your workshop are also eligible for an award. Send entries to *Mechanix Illustrated* Workbench Awards, 67 West 44th Street, New York 18, New York.

Cubic trailer sleeps two, has built-in sink, ice box and stove. Craftsman Thomas L. Elliot of Indianapolis says, "Although it's only 8 ft. long, this trailer is ideal for weekend jaunts. I plan to really give it a workout in Canada this hunting season."

Junior John Deere tractor was finished in about one week by Arthur Haga of Bergen, N. D. A discarded washing machine motor supplies power; the vehicle's average speed is around 5 mph. Data concerning project supplied by Donna Helstedt.

modern end table

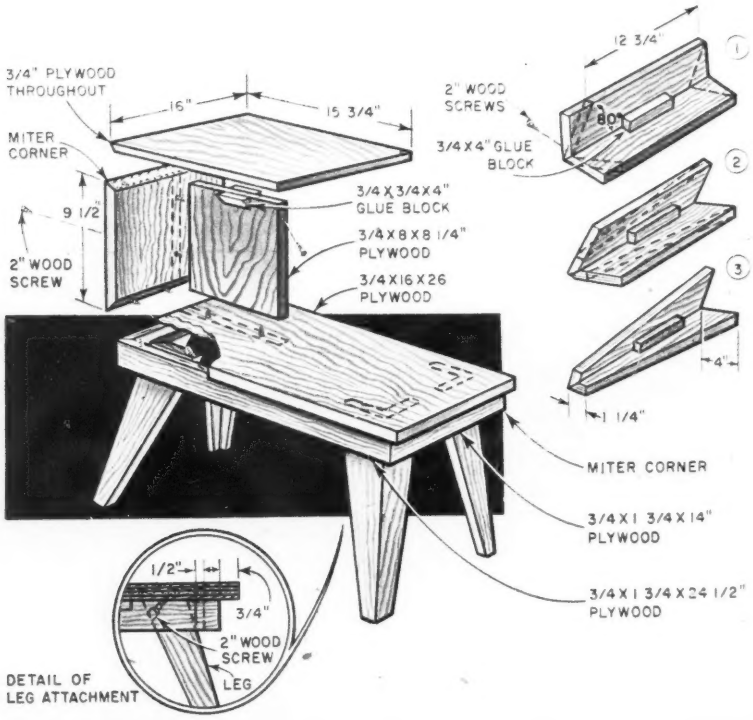
By Joseph J. Beshar

A pair of these flanked along your couch or a single one set in a wasted corner space will do much to increase the appearance of your home.

BOTH units featured on these pages have been designed so that their uncluttered appearance makes for easy construction. The material used throughout was ¾-in. plywood faced with beech or maple.

Let's begin with the end table. Cut down the shelves and both uprights to specified sizes. Glue and screw the top shelf to the back. The upright is then put in place with glue blocks at the top, and wood screws and glue at the back and bottom. Line up and screw the base in place from the bottom. Next construct the 1¾-in. apron with mitered corners and attach to the base with blocks and 2¼-in. wood screws, locating it ¾ in. from all edges.

The legs are cut as indicated in the diagrams. Assemble with glue blocks and screws and cut two 80° bevels 12¾ in. along the edges. Taper the sides of each leg on a circular saw from 4 in. along an 80-degree taper to ¼ in. along the opposite



modern coffee table

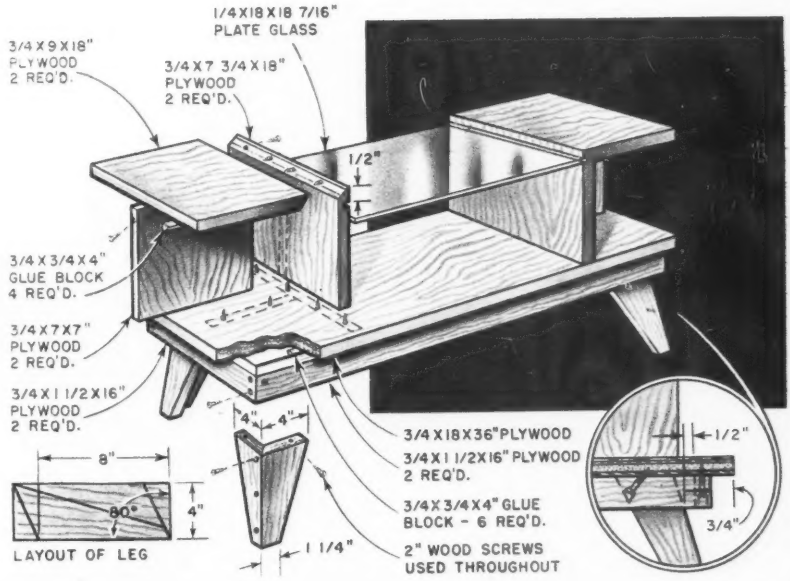
Bring your living room up to date with one or both of these contemporary units.

taper. Attach to the base ½ in. from each side of the apron.

Begin the coffee table by cutting all shelves, uprights, and the 1½-in. apron. Cut 5/16 by ¼-in.-deep dadoes for your plate glass ½ in. below the mitered edge of the transverse uprights. Apply glue to all adjoining edges, and attach shelves to the backs of both sides and screw to the base. Next insert the uprights and attach the apron to the lower shelf, again centering ¾ in. from all sides. The legs are made in the same manner as those for the end table, except the cut-off dimension is 8 in. between the 80° bevels. Complete assembly of the coffee table by locating legs ½ in. from each side of the apron at corners and attach with screws and blocks.

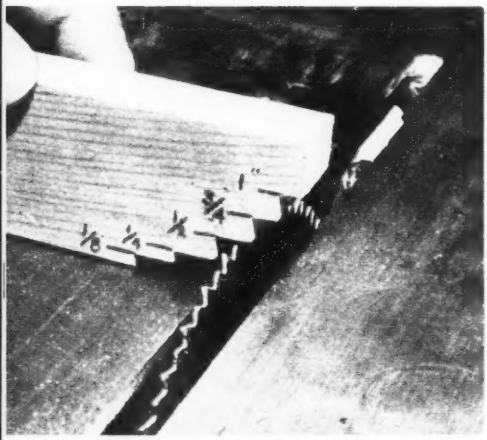
In finishing, touch up exposed plywood edges with matching lacquer. Apply a coat of filler, then the final finish—clear lacquer or shellac. Lastly, slide your plate of glass into the dadoes and the table is ready to use. •

A sturdy glass shelf on coffee table removes possibility of marring top surface with spilled liquids —an important consideration with such pieces.



Craftsman's Corner

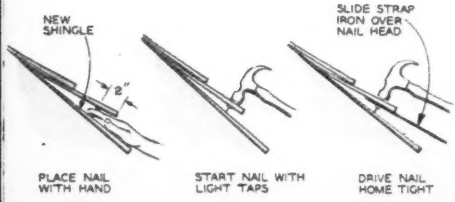
Drilling pilot holes without a standard bit is no problem. An ordinary finishing nail of appropriate diameter makes a very effective substitute. Clip off the nail head to insure a firm grip in the drill chuck.

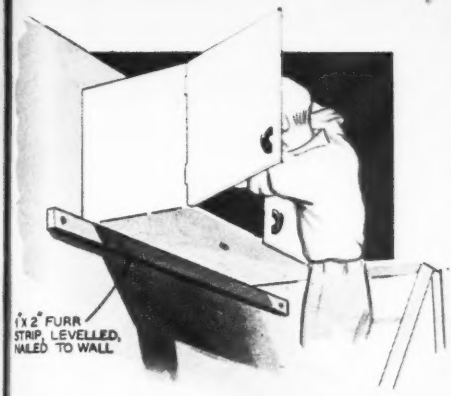


Depth gauge for cutting rabbets, grooves, or tenons on a circular saw can be made with a length of hardwood. Cut steps into one end, each step accurately measured to the correct dimension. To use, set gauge over saw blade and raise latter until it touches desired dimension.

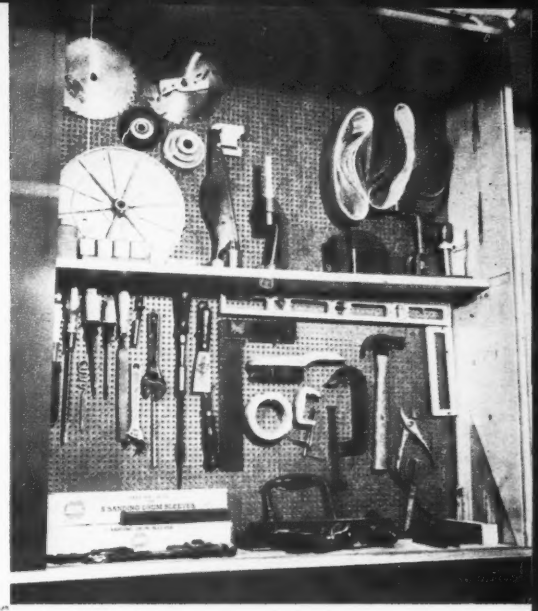
Ladder pads cut from sections of a discarded auto tire prevent the top of an extension ladder from scratching paint or walls. Pass bolts through tire edges as shown. In actual use, tread faces wall.

Shingle replacement is made easier and neater by this method. Lift covering shingle high enough to stand nail on end at least 2 in. above overlap. Press down nail, then slide length of strap iron over nail head. Proceed as indicated in sketch below.





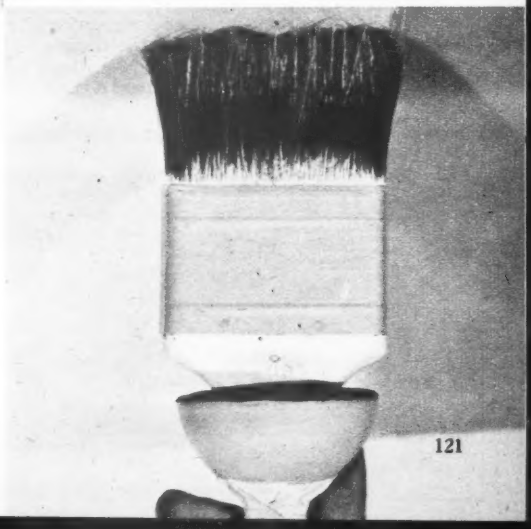
Wall cabinets are difficult to install evenly. Make a guide by tacking a furring strip to the wall where the base of the cabinet will finally rest. Put unit on strip, push it tightly against the wall, and fasten in place.

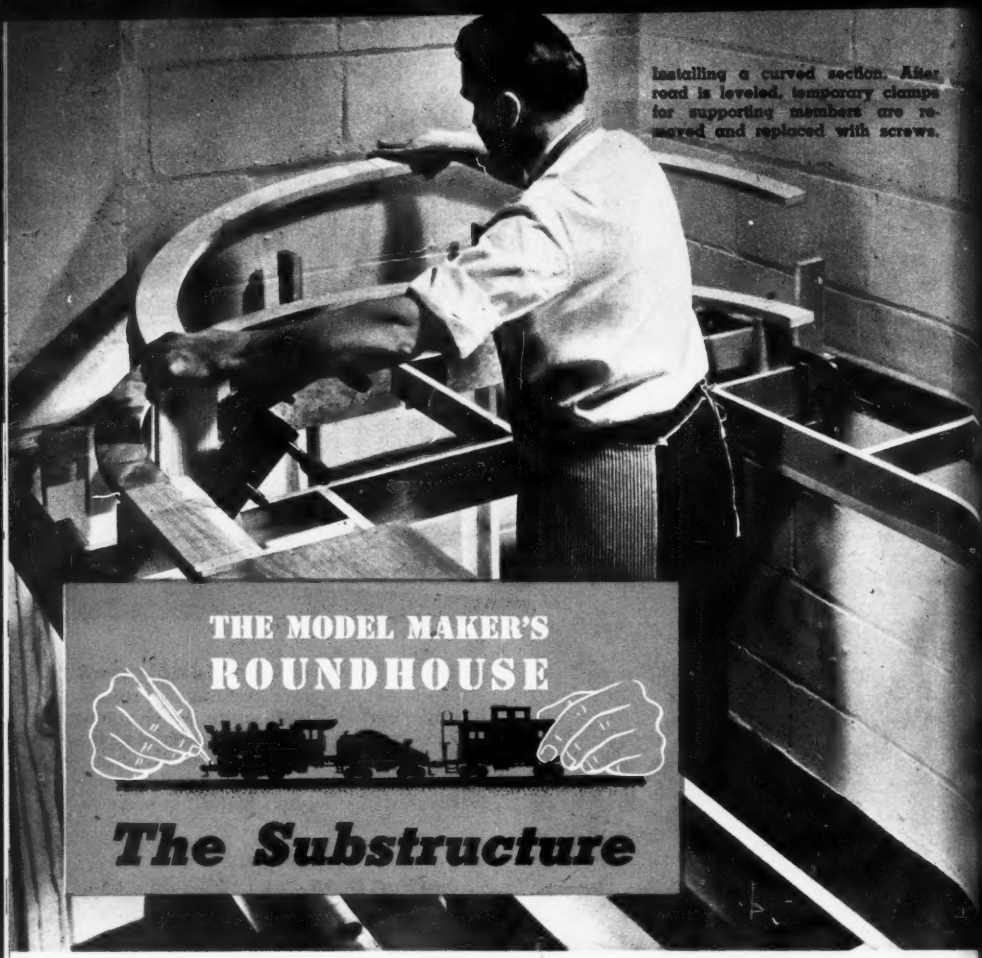


Quick-change tool rack is adaptable to your growing tool collection. Perforated Masonite, which comes in 1/8 or 3/16-in. thicknesses, serves as the backing. Dowel pegs are inserted into the holes in any convenient pattern, may be shifted easily to make more space.

Solder iron rest with legs for extra stability and safety is made by cutting off the entire end of a can with an opener designed for this purpose or with a hack saw. The legs are punched through with common beer can opener.

No-drip device for overhead painting is fashioned from a rubber ball cut in half. After cutting a slit in the center of the hemisphere, slip it over brush handle and tape firmly.





Installing a curved section. After road is leveled, temporary clamps for supporting members are removed and replaced with screws.

THE MODEL MAKER'S
ROUNDHOUSE

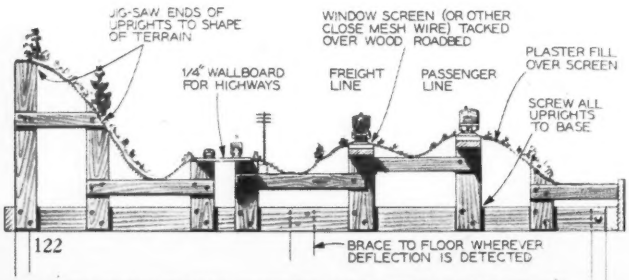
The Substructure

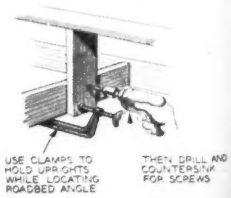
By Walter E. Schutz

AMERICAN railroads spend a major portion of their income on the maintenance of the right-of-way because they know that a good roadbed and a good right-of-way means better efficiency, higher speed, less maintenance, and better all-around operating conditions.

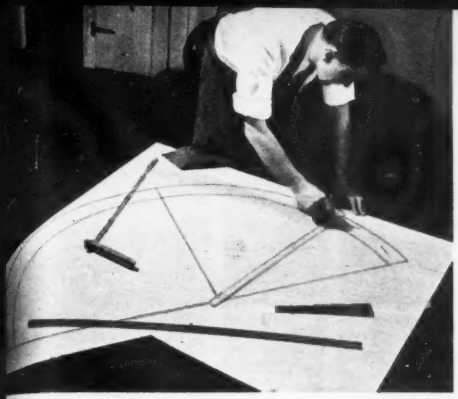
In model railroading, the roadbed and the substructure are just as important. There are too many instances of owners who have spent a great amount of time

Cross section through benchwork under greatly sloped terrain

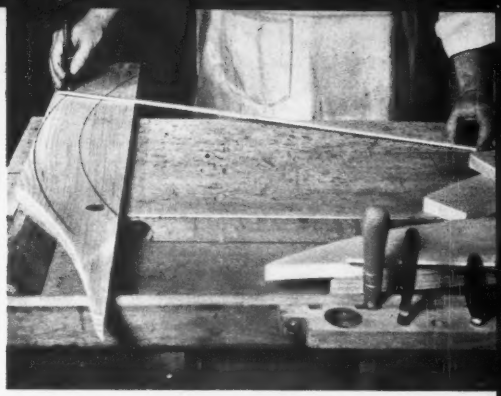




CROSS SECTION THROUGH BENCHWORK UNDER GREATLY SLOPED TERRAIN

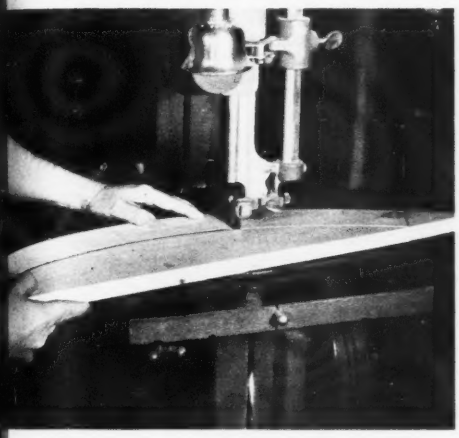


To facilitate assembly, the actual size curves should be laid out on a large sheet of paper.



A long stick with a series of holes drilled near the end can serve instead of a beam compass.

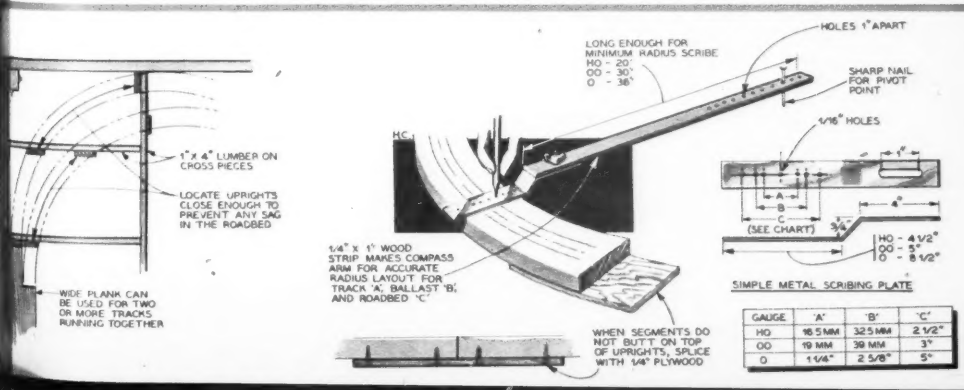
A band saw or a jig saw is a great aid in cutting the curved pieces accurately and quickly.



The curved pieces are assembled by screwing ¼ in. plywood plates to underside of curved sections.

in building trains, turnouts, track and scenery, only to find out that if a little more time and effort had been spent on the benchwork, it would have had resulted in not only a better layout, but also a smoother and more realistic railroad.

On these pages is a simple, practical way to build a solid, substantial substructure out of ordinary stock lumber. All of it can be built with ordinary hand tools. If power tools are available, they will speed up construction—a band saw for cutting irregular shapes and curves, and a circular saw for ripping the pieces [*Continued on page* 182]



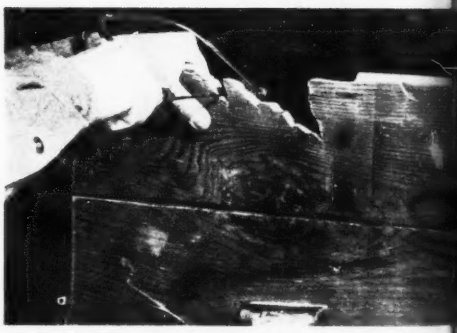
GAUGE	'A'	'B'	'C'
HO	16.5 MM	32.5 MM	2 1/2"
OO	19 MM	39 MM	3"
O	1 1/4"	2 5/8"	5"

Rustic Shutters

IT'S no trick at all to tack up panels or lath beside your windows and call them shutters. But if you take pride in your domicile, why not spend a few profitable hobby hours and turn out something that you'll enjoy for years to come?

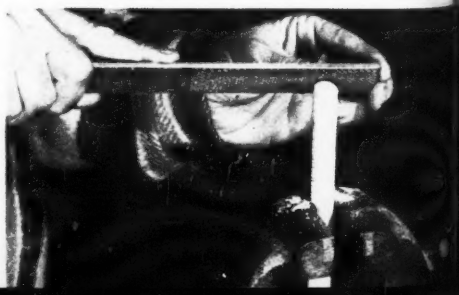
Let's see how easily these distinctive shutters can be made. If you happen to have some old grainy boards in the garage, you've got a head start. All you'll need in addition are some dowels, leftover paints and varnish and a few ordinary tools.

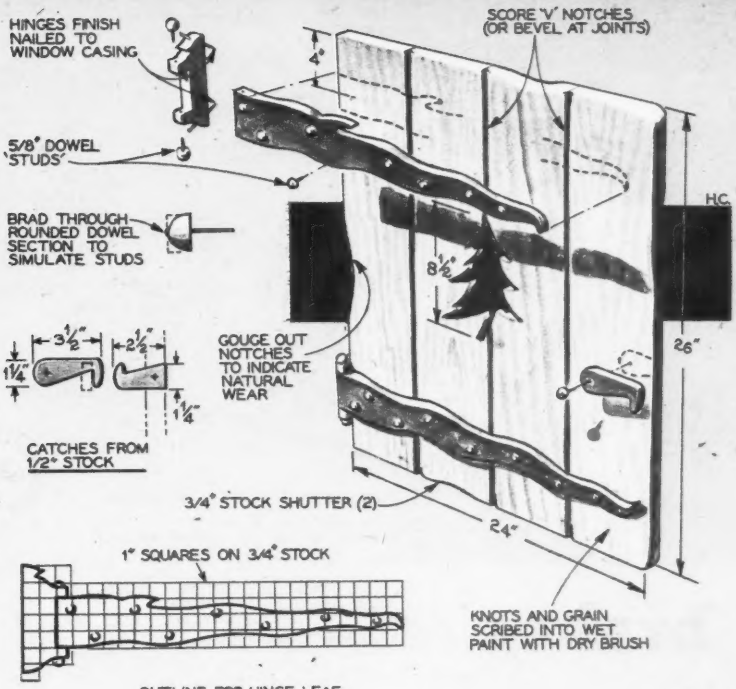
Fairly soft woods, such as pine or redwood, are preferred for this job. If you do not have V-rustic siding in 8-inch width, take some old 1x12-in. stock and saw to the desired length. To secure the proper length or height, measure from the middle of the sill to the inside edge of the top window frame. [*Continued on page* 183]



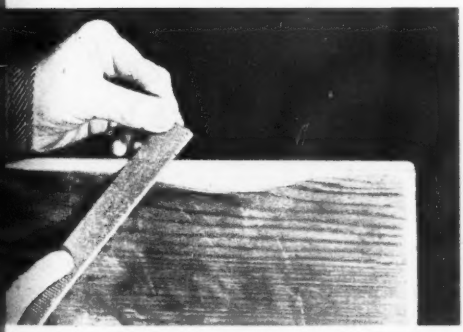
Before attaching the scored 1x12-in. pieces that serve as elements of one shutter, cut out half of proposed design from the adjoining edge of each.

To make studs, hold length of 5/8-in. dowel in vise, round end with rasp, cut off rounded tip and insert brad. Finished stud is seen at the extreme right.

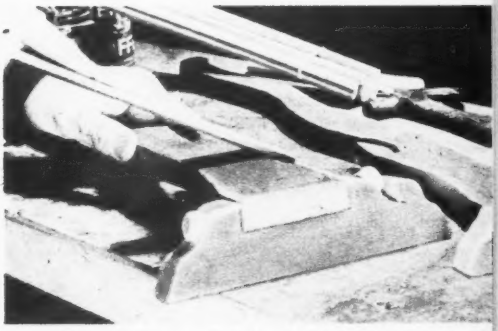




OUTLINE FOR HINGE LEAF



Roughen some of the outside edges at random to achieve that rustic appearance. Use progressively finer rasps, then sand smoothly to ease painting.

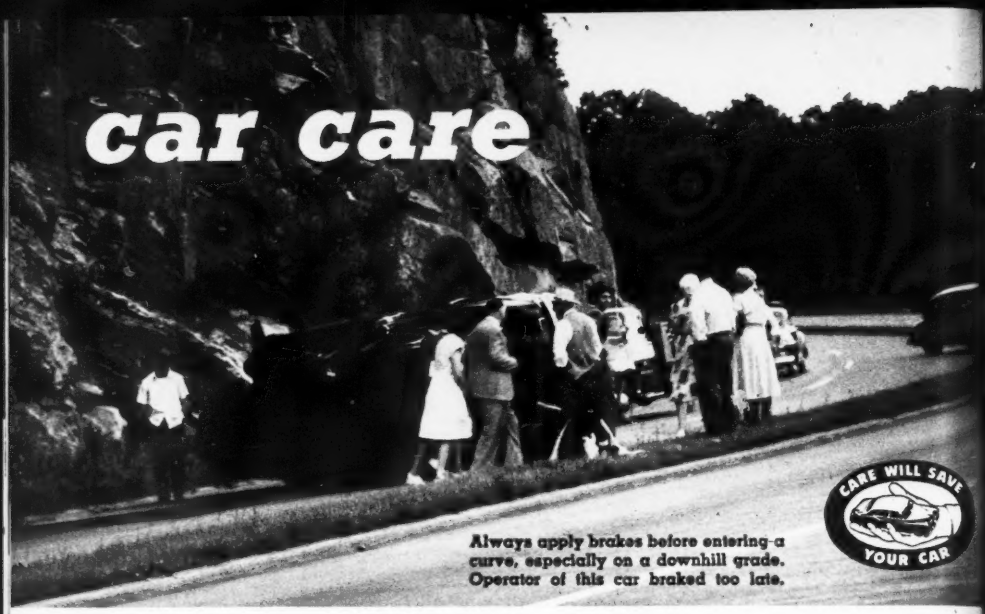


A jig like this will simplify the shaping of your custom-made hinges. General outline to be followed is indicated in diagram at top of the page.

After undercoat is applied, brush on thin coat of spar varnish. The cutout design is then edged with enamel. Orange was color used in this case.

In all cases shutters are proportioned to windows as much as possible. This one was made wider to correspond with a long narrow stretch of glass.

car care



Always apply brakes before entering a curve, especially on a downhill grade. Operator of this car braked too late.

brakes

By Frederick C. Russell

JUDGING from the skids and upsets one sees every day, coming to a smooth stop with equalized braking is more important than braking power itself. "Straight-line braking" often means the difference between a smooth, safe stop and a quick trip to the nearest hospital.

Only by realizing that so-called hydraulic brakes are in reality extremely mechanical, can we fully grasp the importance of aiming for equalization. Brake-pedal pressure may be reaching all four wheel-brake cylinders at the same time, and equally, but what happens from there on is what counts. Many observers believe that a high percentage of highway casualties result from hydraulic brakes having come into popularity under false colors. A hydraulic system is an equalized system of braking only if the car owner keeps it that way.

Whether a [*Continued on page* 160]

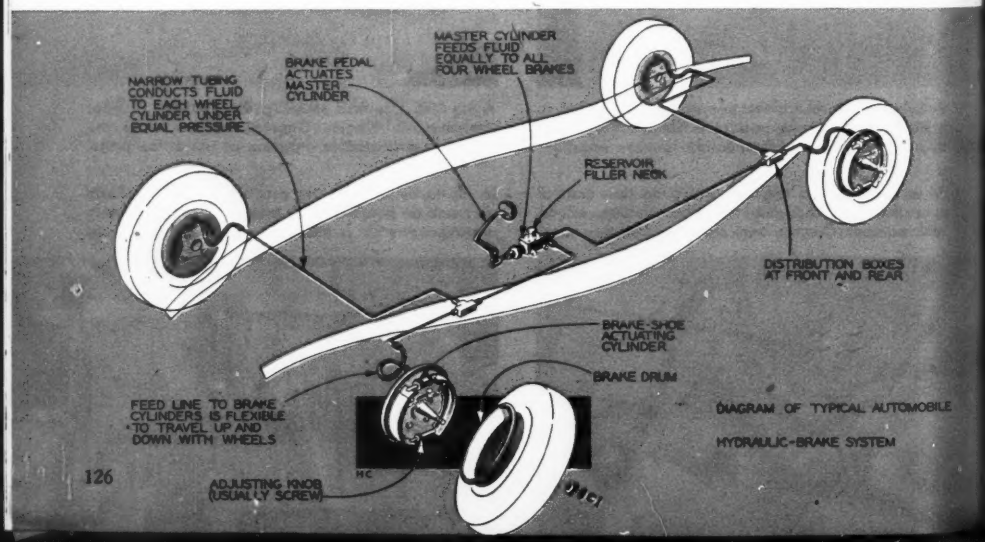
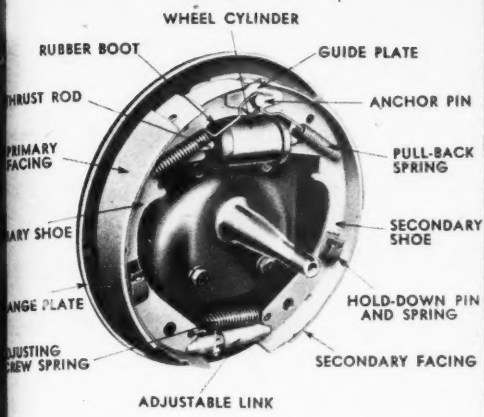
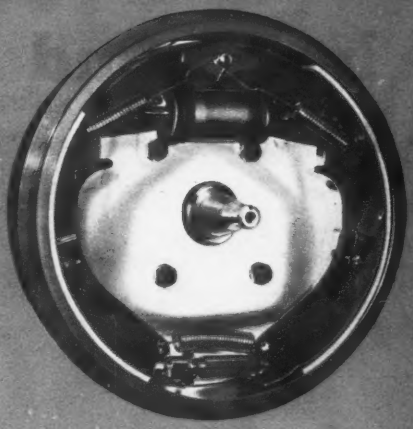


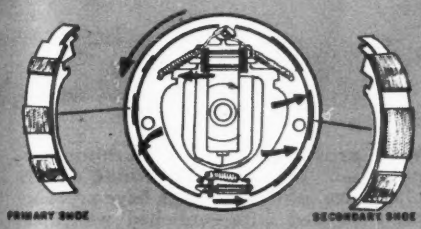
DIAGRAM OF TYPICAL AUTOMOBILE HYDRAULIC-BRAKE SYSTEM



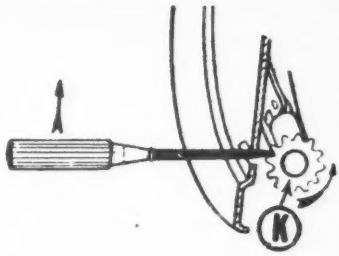
Detail of 1951 Chevrolet floating brake. Note that an inch or so of the ends of both the brake shoes is not covered with lining. This prevents squealing.



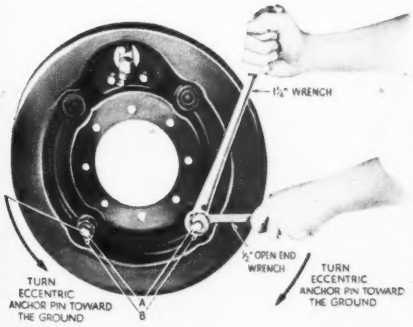
Another view of the Chevrolet brake. A single anchor pin holds it stationary. Released, the brake floats free. Three springs are employed.



On the Buick Roadmaster brake depicted here, the lining is installed in short segments to provide better ventilation and to prevent any squealing.

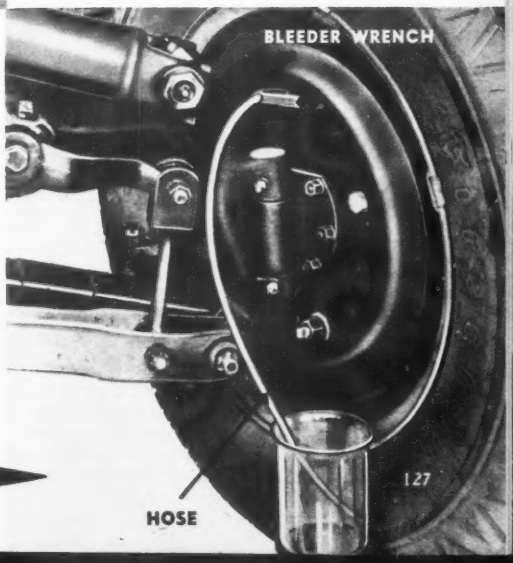


To adjust a Bendix Double-Anchor brake, tighten the star wheel, using a screwdriver as shown, until the drum can be barely turned by hand.

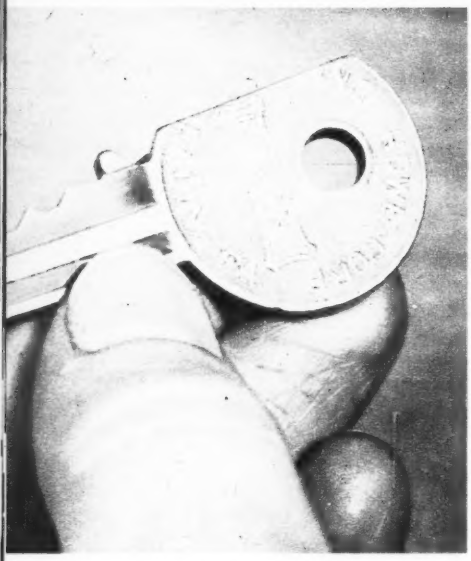


With so many types of brakes, it is important to have the proper instructions for the brake being worked on. This is a Timken dual primary brake.

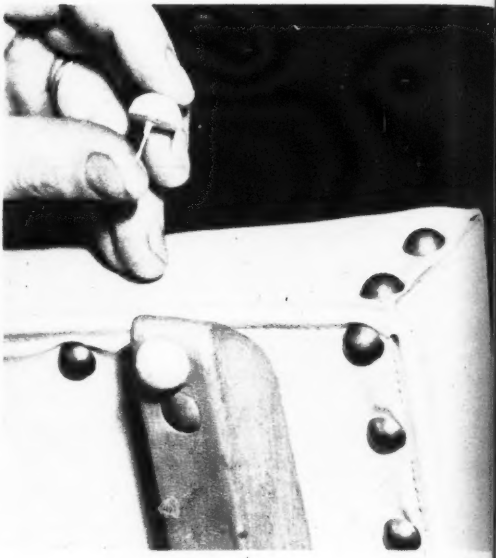
When draining brake fluid, you can detect bubbles in the system by putting the tube's outlet under the surface of some new fluid in the receptacle.



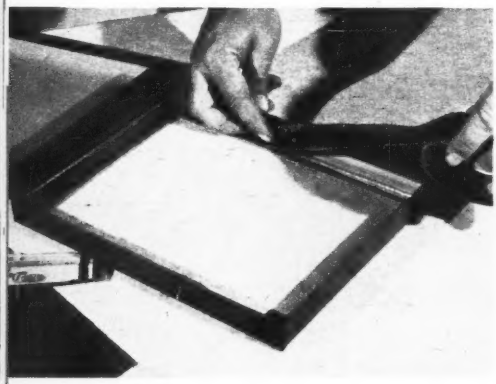
home and hobby hints



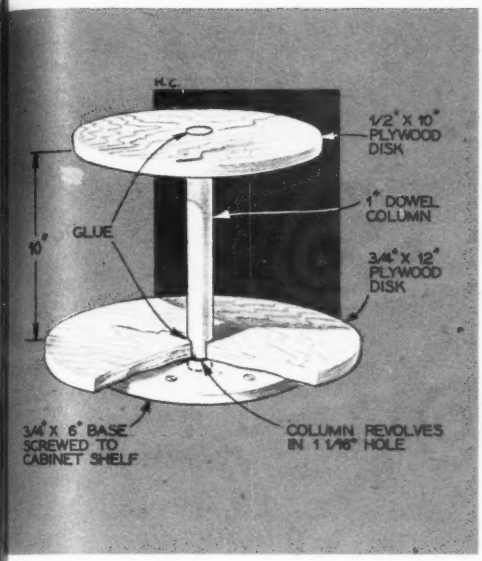
Fumble-proof key to your front door will always be easy to find—even in the dark—if you file the head flat as shown. Other keys on the same ring that are frequently used in dim locations may be identified by a notch, series of notches, or other design.



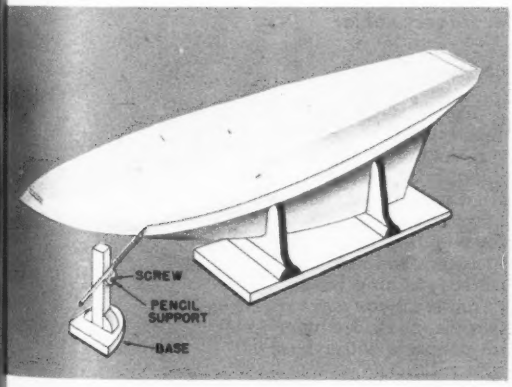
Wall protector. If your furniture arrangement includes occasional chairs placed against the wall, you have probably been plagued with scratched wallpaper. Remedy the situation by inserting rubber-head tacks at the chair's points of contact.

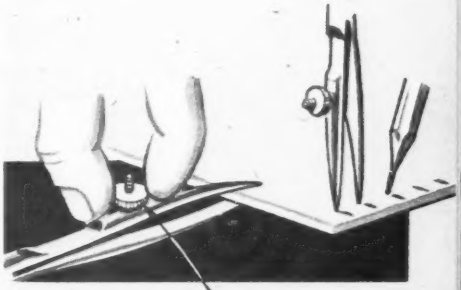


Prize specimen cases can be fashioned from empty photographic enlarging paper boxes, which are strong and of ideal depth for this purpose. Cut out a rectangle from the cover, leaving a ½-in. border. Then tape in a sheet of glass. Pad box with cotton and put your specimens inside. Fasten cover in place with pins.



Revolving spice rack is excellent for those small cans that are so hard to identify when stored on an ordinary shelf. Base and lower shelf are made from ¾-in. stock or plywood; the upper shelf is only ½ in. thick. A 1-in. dowel serves as the column on which unit turns. Screw the rack to a convenient shelf for extra rigidity.





Turning knob gives delicate "feel" for thickness or division

Striking the waterline on models is easy with this device. It consists of a base, an upright glued in place, and a pencil support block. Place model in bathtub, mark lightly actual waterline on stem and stern, then employ the marker as shown above.

Thickness guide, useful to modelers who must duplicate width of various materials, may be improvised with a ruling pen. Turn the knob until the prongs make light contact with the edges of item to be gauged For use on wood, cardboard, metals, etc.

how to build CABALLERO

Length: 19 ft. Beam: 6½ ft. Displacement: 1,750 lb.

Speed: 27 mph with two 25-hp motors, 17 mph with one 25-hp motor.

By Charles M. Ungerbuehler

Naval Architect

CABALLERO was designed for the amateur builder who desires a roomy, fast, and comfortable cruiser without the attendant high building and upkeep costs usually associated with inboard craft. She is a direct development of an earlier design that has proved successful in the hands of a large number of builders.

The cabin provides comfortable quarters for two. Besides the berths, it contains a galley stove, food locker, icebox, watercloset, and adequate storage space. There is not, of course, standing headroom. There is, however, ample sitting headroom. That is all you can expect in a boat of this size; so don't be persuaded by some misguided amateur adviser to increase the headroom in hope of making a better boat of her. You have the word of the designer that you will not.

Caballero's rough-water ability will be excellent. The hull shows a pronounced flare forward and the maximum allowable deadrise consistent with her speed requirements. Her afterbody is of the constant-section type, which will insure comfortable banking on the turns and a smooth, disturbance-free, level ride.

While the boat has been specifically designed to carry two of the

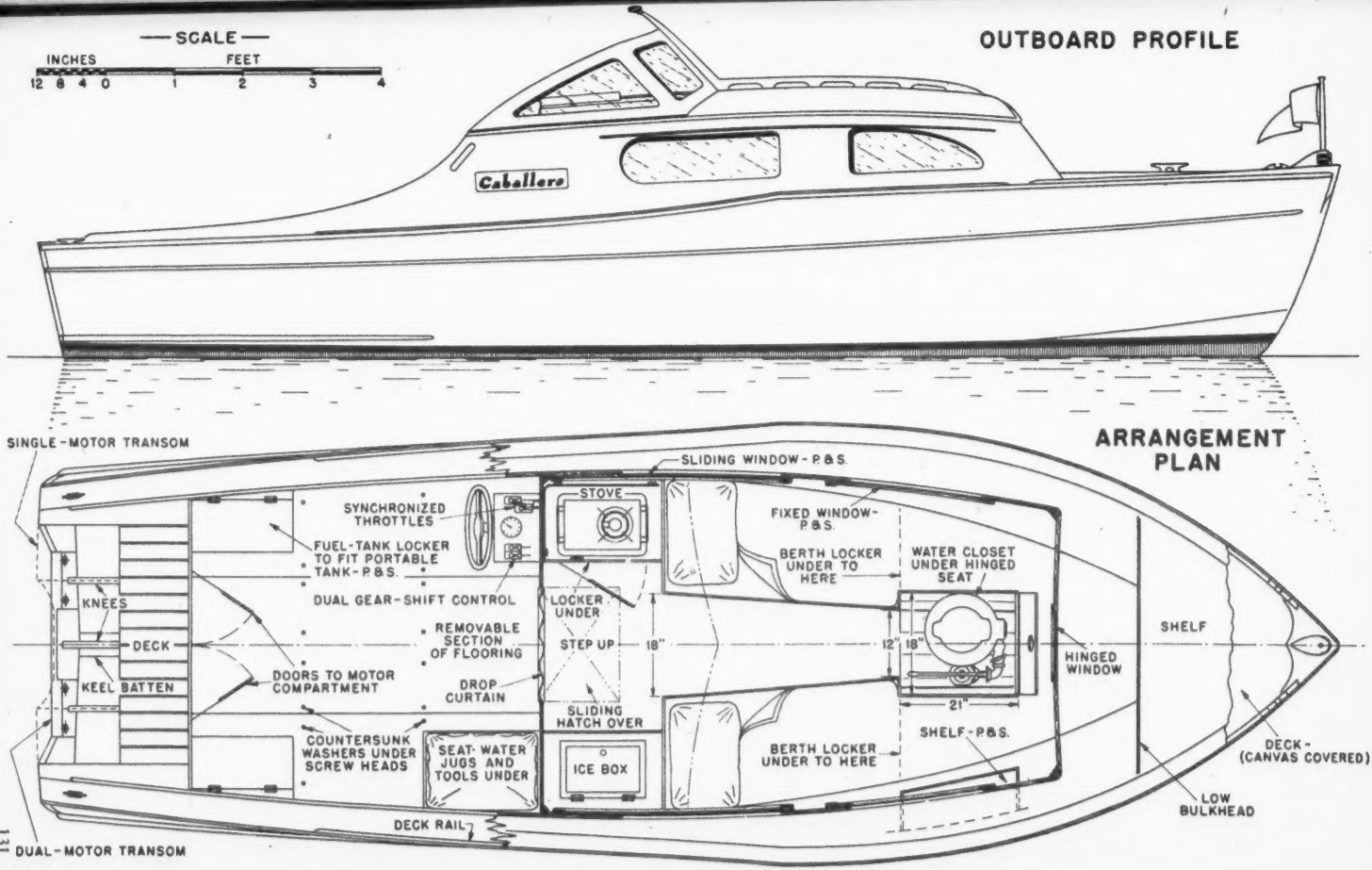
0

ated

— SCALE —

INCHES FEET

OUTBOARD PROFILE


SCALE
INCHES
FEET
12 8 4 0 1 2 3 4
OUTBOARD PROFILE
Caballero
ARRANGEMENT PLAN
SINGLE-MOTOR TRANSOM
SLIDING WINDOW-P.&S.
STOVE
SYNCHRONIZED THROTTLES
FIXED WINDOW-P.&S.
FUEL-TANK LOCKER TO FIT PORTABLE TANK-P.&S.
BERTH LOCKER UNDER TO HERE
WATER CLOSET UNDER HINGED SEAT
DUAL GEAR-SHIFT CONTROL
LOCKER UNDER
KNEES
REMOVABLE SECTION OF FLOORING
STEP UP
18"
12"
18"
SHELF
DECK
HINGED WINDOW
KEEL BATTEN
DOORS TO MOTOR COMPARTMENT
DROP CURTAIN
21"
SLIDING HATCH OVER
SHELF-P.&S.
COUNTERSUNK WASHERS UNDER SCREW HEADS
SEAT-WATER JUGS AND TOOLS UNDER
ICE BOX
BERTH LOCKER UNDER TO HERE
DECK-(CANVAS COVERED)
LOW BULKHEAD
DECK RAIL
DUAL-MOTOR TRANSOM

new 25-hp motors manufactured by Johnson Motors, it is in no wise restricted in this respect. It can be powered with any single 25-hp motor or single 33-hp motor, for the boat is large enough to have sufficient fore-and-aft stability so the slight differences in weight will have little effect on her trim. A single 25-hp motor, equipped with the proper wheel, will produce about 17 mph. Two of these motors, equipped with higher-pitched wheels allowing the motors to turn up their rated revolutions, will give about 27 mph. A single 33-hp motor will show about 21 mph. The boat will not perform properly when powered with less than 25 hp.

The plans show a simple compensating device that will effectively synchronize two motors to eliminate "wow-wow" and to hold the hull on a true course.

There are two things you can't do with Caballero. First, you can't plank her with large sheets of plywood. Since she has compound curves on both topsides and bottom, plywood sheets just won't go on. Second, you can't expect good performance with four or five passengers in her cockpit. Some of your guests should not object to riding in the light and airy cabin in order to hold the boat to her proper trim.

With prices varying as they do today, there is no way of knowing what she is going to cost you to build. However, here is one thing you can bank on. Build and finish her properly and you won't have her in the water many days before some envious boat lover offers you half as much again as she cost you—which probably won't be enough for you to let her go.

Before beginning construction, lay down the lines full size from the table of offsets. Build the hull upside down over a rigidly braced form that is cut to fit the top edge of the keel batten and is notched at intervals to hold the frames rigidly in their proper locations. Tie each pair of frame heads together at the sheer with a sturdy spreader and mark the center line on each spreader. If these center lines are made to line up as the frames are positioned on the form, and if the full-size drawing has been properly done, the boat is bound to be fair when finished.

Note that all frames stand at right angles to the base and that the lapping of side and bottom frames reverses between frames No. 3 and No. 4.

Specifications

Material. All lumber should be free from knots, shakes, checks, or warp, with the exception that tight knots not over ½ in. in diameter in the planking material are permitted. All fir plywood should be edge-branded "EXT-DFPA." All mahogany plywood should be guaranteed bonded with waterproof resorcinal adhesive. No mixing of ferrous and nonferrous fastenings should be permitted. All butting or lapping exterior surfaces should be coated with non-hardening marine glue. All framework and planking should be treated with wood preserver before painting. All hardware, fittings, paints, varnishes, stains, fillers, etc., should be of the marine type. Where more than one material is specified, they are listed in the order of their preference. All material sizes are net dressed. Any minor part of the interior not actually dimensioned can be either scaled or sized to suit the builder.

Keel. White oak, 2 in. thick, shaped as shown.

Keel Batten. White oak, 1¼x4 in., beveled to match the frames and receive the planking. Secure to keel with 2½-in. screws on 4-in. centers. Set the screw heads in counterbores and plug them.

Stem. White oak, 2 in. thick, made up from three shaped pieces as shown. Assemble the pieces with six carriage bolts, setting the bolt heads in counterbores in the stem face. Bevel the stem to a ½-in. face, rabbet it for the planking, and secure it to the keel assembly with three carriage bolts.

Stopwaters. White-pine doweling, ½ in. in diameter, glued in holes through stem in positions shown.

Floor Timbers. White oak, ⅞ in. thick, 2½ in. minimum depth above keel batten, and not less than 18 in. long in the after frames (forward, the lengths will reduce because of the angle of the bottom). Notch each for the keel batten and secure with a ¼-in. carriage bolt through the batten, counterboring for each bolt head and plugging.

Bottom Frames. White oak, ¾x2½ in. Secure each to its floor timber with six ¼-in. machine bolts, placing washers under heads and nuts.

Side Frames. White oak, ¾ in. thick, 2 in. wide at heads, 3 in. wide at heels. Secure each to its bottom frame with two ¼-in. machine screws, placing washers under heads and nuts. After positioning the frames on the building form, notch them to receive the inner chines.

Chines. Each composed of two pieces. Inner piece is 1x2½-in. white oak and outer one is 1x2-in. mahogany. Set inner pieces in notches in frames (including transom frame) and box them into the stem. Secure at each joint with two 2¼-in.

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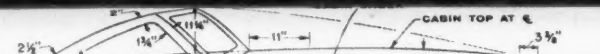
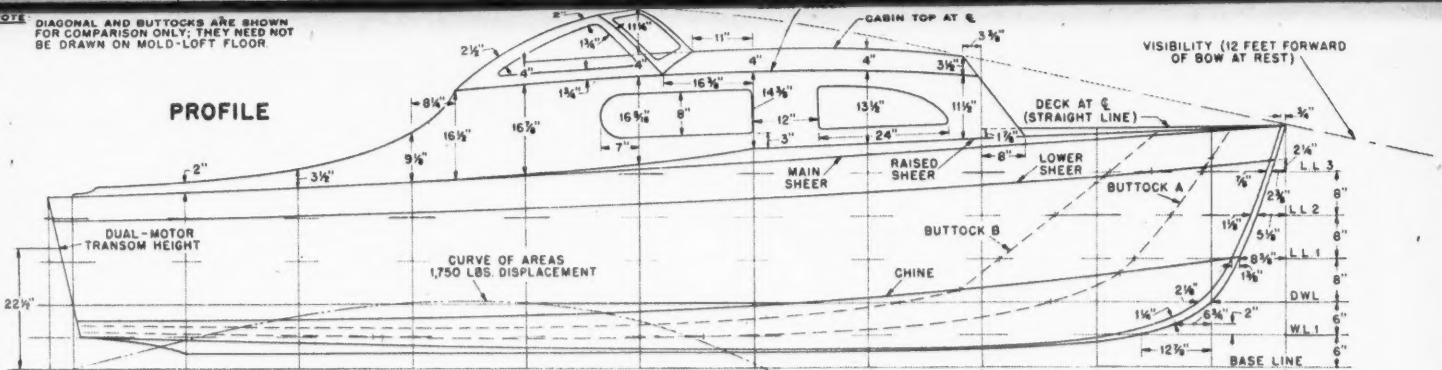
NOTE: DIAGONAL AND BUTTOCKS ARE SHOWN FOR COMPARISON ONLY; THEY NEED NOT BE DRAWN ON MOLD-LOFT FLOOR



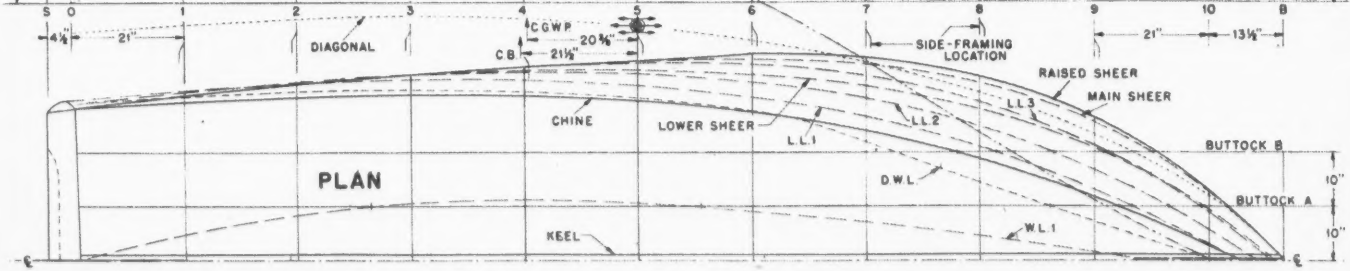
VISIBILITY (12 FEET FORWARD

NOTE: DIAGONAL AND BUTTOCKS ARE SHOWN FOR COMPARISON ONLY; THEY NEED NOT BE DRAWN ON MOLD-LOFT FLOOR.

PROFILE



PLAN



CHARACTERISTICS

OVER ALL LENGTH	19'-0"
WATER-LINE LENGTH	17'-6"
BEAM (EXTREME)	6'-5"
HULL DRAFT	9"
DISPLACEMENT (FRESH WATER)	1,750 LBS.
BLOCK COEFFICIENT	0.428 %
PRISMATIC COEFFICIENT	0.723 %
FINENESS COEFFICIENT	0.769 %
AREA OF WETTED SURFACE	78.6 SQ. FT.
AREA OF WATER PLANE	70.5 SQ. FT.
MOMENT TO CHANGE TRIM 1"	146 FT. LBS.
LBS. PER INCH IMMERSION	367 LBS.

BODY PLAN

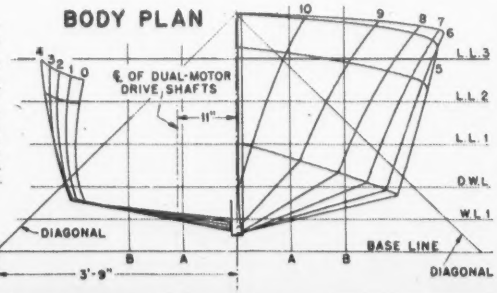


TABLE OF OFFSETS

DIMENSIONS GIVEN IN FEET, INCHES, AND SIXTEENTHS OF INCHES TO OUTSIDE OF PLANKING

STATION	0	1	2	3	4	5	6	7	8	9	10	B
HEIGHTS ABOVE BASE LINE												
KEEL		0-3-0	STRAIGHT					0-3-0	0-3-6	0-4-9		
FAIRBODY	0-6-0	0-5-6	0-4-14	0-4-6	0-3-14	0-3-10	0-3-8	0-3-6	0-3-12	0-5-6	1-2-0	
CHINE	0-9-0	0-9-1	0-9-3	0-9-7	0-9-14	0-10-10	0-11-9	1-0-14	1-2-10	1-4-14	1-7-9	
LOWER SHEER	2-3-10	2-3-14	2-4-7	2-5-1	2-5-12	2-6-8	2-7-7	2-8-7	2-9-10	2-11-2	3-1-0	
MAIN SHEER	2-8-0	2-8-11	2-9-10	2-10-10	2-11-11	3-0-14	3-2-3	3-3-7	3-4-12	3-6-2	3-7-7	3-8-8
RAISED SHEER	2-8-0	2-8-11	2-9-10	2-10-10	2-11-14	3-1-13	3-4-10	STRAIGHT				3-8-8
WIDTHS FROM CENTER LINE												
FAIRBODY	0-1-0	STRAIGHT										0-1-0
CHINE	2-4-4	2-5-8	2-6-7	2-6-14	2-6-12	2-5-13	2-3-11	2-0-2	1-6-13	0-11-11	0-2-12	
D.W.L.	2-5-3	2-6-8	2-7-8	2-7-12	2-7-8	2-6-5	2-3-14					
L.L. 1	2-5-14	2-7-10	2-8-14	2-9-11	2-9-11	2-8-10	2-6-8	2-2-12	1-9-1	1-1-0	0-2-14	
L.L. 2	2-5-1	2-7-6	2-9-5	2-10-10	2-11-2	2-10-12	2-9-4	2-6-2	2-0-13	1-4-12	0-5-10	
LOWER SHEER	2-5-2	2-7-6	2-9-5	2-10-10	2-11-6	2-11-7	2-10-9	2-8-6	2-4-0	1-8-12	0-9-5	
L.L. 3						3-0-13	3-0-7	2-10-6	2-5-8	1-9-4	0-8-14	
MAIN SHEER	2-4-4	2-6-10	2-8-12	2-10-10	3-0-2	3-1-1	3-1-7	3-0-6	2-8-15	2-1-11	1-0-11	
RAISED SHEER	2-4-4	2-6-10	2-8-13	2-10-10	3-0-2	3-1-4	3-2-9	3-1-11	2-10-2	2-2-9	1-1-0	

PAUL PLECAN

screws. Extend outer pieces to back face of transom and secure at each joint with a No. 8 screw that's set in a counterbore and plugged. The outer edge of each outer chine must be left sharp from frame No. 7 aft, or speed will be reduced.

Battens. White oak, ½x1½ in., in single lengths if possible. Set them in notches in the side frames located to divide each frame from lower sheer to chine into four equal spaces. Divide the space from lower sheer to raised sheer into two equal spaces. Box the battens into the stem and notch them into the transom frame, but not into the transom itself. Lay the bottom battens out to allow the garboard strakes to be slightly wider than their neighbors, with their outer edges as straight as possible. The remaining planks should be approximately the same width at each frame. The forward ends of the bottom battens should box into the inner chines. Secure each batten at each joint with a 1¼-in. No. 10 screw.

Limber Holes. Cut two through each frame and floor timber next to the keel batten. They should be of ample size to allow bilge water to flow freely to the low point of the boat.

Transom. Mahogany, 1⅛ in. thick, made up of two pieces. Secure the pieces together with a spline and Cascophen glue. Fit framing, cleats, motor board, and knees as shown, securing them to the transom with nonhardening glue and the following fastenings: 1½-in. No. 10 screws, set in counterbores and plugged, through the transom into the framing; and ¼-in. carriage bolts, also set in counterbores and plugged, through transom and knees.

Bottom Planking. White cedar, ½ in. thick. Garboard strakes should be in single lengths. Each of the remaining strakes can be made from two pieces if a ½-in. oak block, 8 in. long, is fitted behind the butt tightly between the battens. There should be at least two strakes between butt blocks falling between the same pair of frames. Secure planks to frames, keel batten, stem, transom, and chines with 1¼-in. No. 8 screws on 3-in. centers, and to battens with ⅞-in. No. 8 screws on 3-in. centers.

Side Planking. White cedar, ½ in. thick. The shutter strakes must be in single lengths. The remainder can be butted in the same manner as the bottom planking. Plank the hull to the lower sheer and then turn the boat right-side up, install the clamps, and add the four remaining topside planks. All fastenings are similar to those used in the bottom planking. Lightly countersink them and fill with putty.

Clamps. Spruce, ¾x2 in. Each may be in two lengths. Fasten them a sufficient distance below the frame heads so the deck beams can be set on them. Box them into the stem and transom framing and fit fillers as shown. Secure at each joint with two 2¼-in. No. 12 screws.

Breasthooks and Quarter Knees. White oak, 1 in. thick, securely screw-fastened where shown.

Deck Beams. White oak, ¾x2 in. Cut each full beam to a radius that will give the specified rise and each short beam to match. Secure each beam to each frame head with two 1¼-in. No. 10 screws. Cut the inner ends of the short beams at angles to allow the cabin sides to rake inboard as shown.

Carlings. White oak, ¾x2 in. Half-gain them into the short beams and secure at each joint with a No. 10 screw driven vertically. Note that the forward ends of the carlings extend to the second full deck beam.

Partners and Fillers. White oak, ¾ in. thick, screw-fastened where shown to provide backings for deck hardware and decking ends.

Decking. White cedar, ½ in. thick. Nail to deck beams, carlings, and sheer battens. Cover with 10-oz. canvas set in canvas cement and secured along all edges with short copper nails. Turn canvas up under facing pieces after sills have been installed. Putty all nail holes in the decking before laying the canvas. Finish the after deck natural if desired.

Sills. Mahogany, 1x1¼ in., rabbeted to receive the house sides and secured to the carlings with No. 10 screws.

House Sides. Mahogany plywood, ½ in. thick. Secure to sills with screws. Fit rabbeted corner posts and spruce house clamps, half-notching the latter to receive the house beams. Cut and finish all openings before fastening sides in place. Use Cascophen glue in addition to the fastenings in all joints.

Roof Beams. Spruce, ¾x1½ in. Space as shown and screw-fasten into house clamps. Note the hatch framing at the after end of the house.

Main Bulkhead. Plywood, ½ in. thick. Screw to after sides of side frames No. 4. Fit cleats to the bottom framing to secure this member.

Roofing. White cedar, ⅜ in. thick. Nail to roof beams and house clamps. Cover with 8-oz. canvas, setting it in canvas cement and securing it with small copper nails under the moldings.

Facings. Mahogany, ½ in. thick. Fit against carlings and sills as shown and secure with screws.

Flooring. Plywood, ½ in. thick. Install

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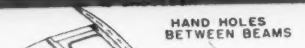
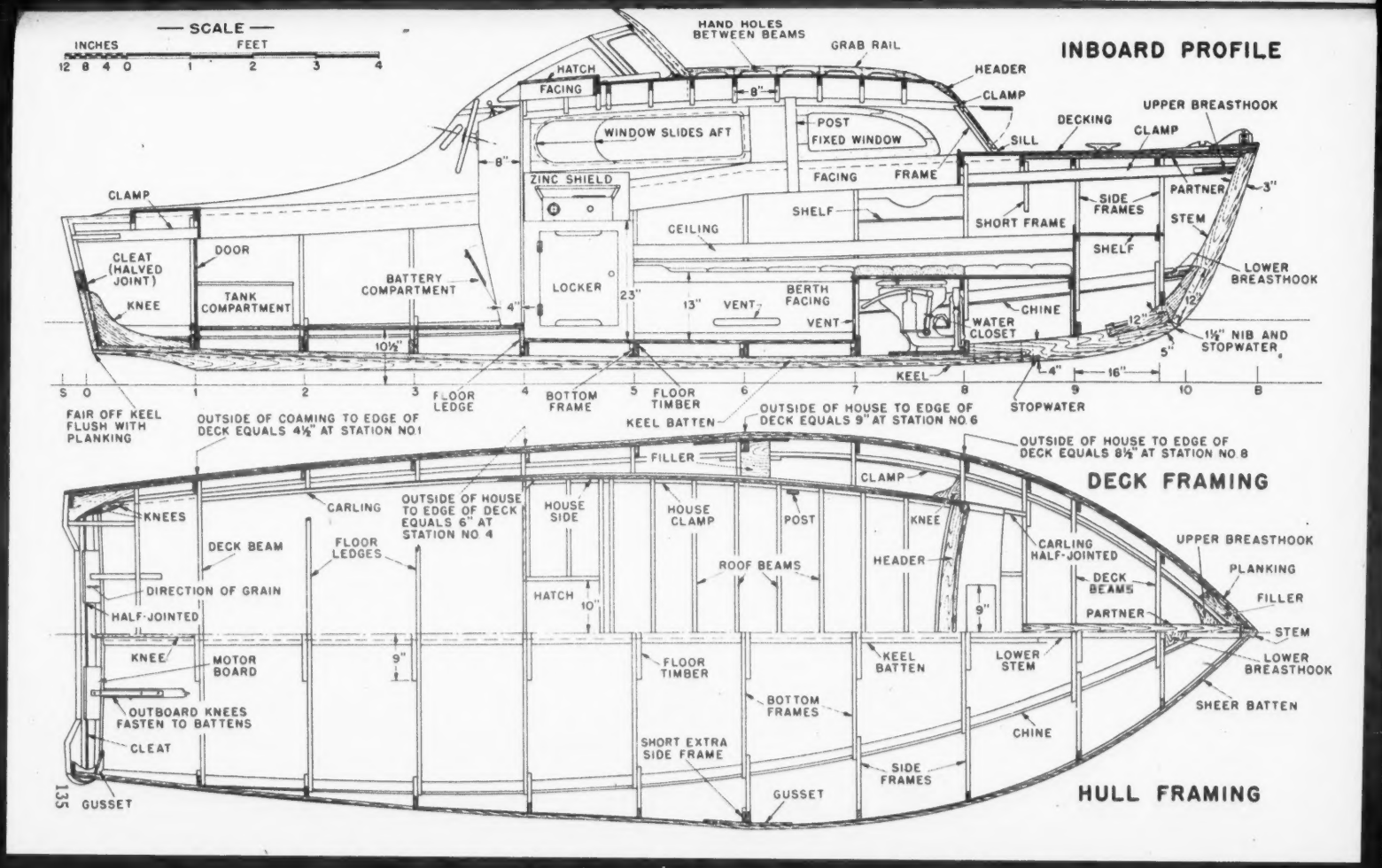
— SCALE —



INBOARD PROFILE


INBOARD PROFILE
SCALE
INCHES
FEET
12 8 4 0 1 2 3 4
HAND HOLES BETWEEN BEAMS
GRAB RAIL
HATCH
FACING
8"
HEADER
CLAMP
UPPER BREASTHOOK
DECKING
CLAMP
SILL
WINDOW SLIDES AFT
POST
FIXED WINDOW
8"
ZINC SHIELD
FACING
FRAME
CLAMP
SHELF
SIDE FRAMES
PARTNER
3"
STEM
CEILING
SHORT FRAME
SHELF
DOOR
CLEAT (HALVED JOINT)
BATTERY COMPARTMENT
LOCKER
23"
13"
VENT
BERTH FACING
VENT
CHINE
WATER CLOSET
LOWER BREASTHOOK
KNEE
TANK COMPARTMENT
4"
12"
12"
1½" NIB AND STOPWATER
10½"
5"
KEEL
4"
16"
S 0 1 2 3 4 5 6 7 8 9 10 8
FAIR OFF KEEL FLUSH WITH PLANKING
OUTSIDE OF COAMING TO EDGE OF DECK EQUALS 4½" AT STATION NO 1
FLOOR LEDGE
BOTTOM FRAME
FLOOR TIMBER
KEEL BATTEN
OUTSIDE OF HOUSE TO EDGE OF DECK EQUALS 9" AT STATION NO. 6
STOPWATER
OUTSIDE OF HOUSE TO EDGE OF DECK EQUALS 8½" AT STATION NO 8
DECK FRAMING
FILLER
CLAMP
KNEES
CARLING
OUTSIDE OF HOUSE TO EDGE OF DECK EQUALS 6" AT STATION NO 4
HOUSE SIDE
HOUSE CLAMP
POST
KNEE
CARLING HALF-JOINTED
UPPER BREASTHOOK
DECK BEAM
FLOOR LEDGES
ROOF BEAMS
HEADER
PLANKING
DIRECTION OF GRAIN
HATCH
10"
DECK BEAMS
FILLER
HALF-JOINTED
9"
PARTNER
STEM
KNEE
MOTOR BOARD
9"
FLOOR TIMBER
KEEL BATTEN
LOWER STEM
LOWER BREASTHOOK
OUTBOARD KNEES FASTEN TO BATTENS
BOTTOM FRAMES
SHEER BATTEN
CLEAT
SHORT EXTRA SIDE FRAME
CHINE
SIDE FRAMES
GUSSET
GUSSET
HULL FRAMING

the cockpit flooring on ledges that are fitted on the bottom frames to raise the floor level to the specified height. Use countersunk washers under all fastenings and provide a removable section to allow access to the bilge. Fit cabin flooring inboard of berths and lockers only.

After Bulkhead. Plywood, ½ in. thick. Fit on the forward side of frame No. 1 and install doors as shown to allow access to the stern compartment.

Berths and Lockers. Plywood, ½ in. thick for the tops and ¼ in. thick for the sides. Sheath the insides of the berth lockers with ¼-in. plywood and make a low bulkhead and shelf of this same material at frame No. 9. Fit two strakes of ¼-in. ceiling above each berth to prevent loose articles from rolling into the bilge.

Icebox. Plywood, ½ in. thick for the top and ¼ in. thick for the sides. Install a galvanized-iron liner, leaving at least 1½ in. of space between liner and box. Fill the space with suitable insulating material. Equip the liner with a ⅜-in. copper drain tube, leading it overboard through the hull side above the water line.

Windshield. Mahogany, ¾ in. thick. Neatly rabbet the cut-outs to take $\frac{3}{16}$-in. Lucite and install the windshield on a sill. Make the mast of similar material, bore it for the wiring, and secure it to the windshield center post.

Grab Rail. Mahogany, ¾x1¾ in. Shape as shown, cutting hand holes between beams, and fasten to each beam with one long screw. [*Continued on page* 168]

LARGE-SCALE PLANS

will greatly simplify construction. Send $3.50 to MECHANIX ILLUSTRATED Plans Service, Fawcett Building, Greenwich, Conn. Please specify Plan No. B-208.

BILL OF MATERIALS

(Approximate Quantities Required)

Specify that all materials are to be used for boatbuilding. All plywood is to be exterior grade. All wood is to be air-dried to a maximum of 15 per cent moisture content. All hardwood is to consist of first, second, and select grades only. All softwood is to consist of A and B grades only.

Fir Plywood

2 panels, ¼" x 4'-0" x 8'-0"
3 panels, ½" x 4'-0" x 8'-0"

Mahogany Plywood

House Sides: 1 panel, ½" x 4'-0" x 10'-0"

White Cedar

Roofing: 40 sq. ft., S2S ⅜", random widths and lengths
Planking and Decking: 400 sq. ft., S2S ½" (Four planks to be 20 ft. long and at least 10 in. wide; remainder can average 15 ft. in length and 6 to 8 in. in width)

Mahogany

Deck Cleats: 12 lineal ft., S4S ⅜" x ¾"
Window Trim: 5 sq. ft., S2S ⅜"
Facing: 30 lineal ft., S2S ½", 6" wide
Windshield: 15 sq. ft., S2S ¾"
Sills: 34 lineal ft., S4S 1" x 1¼"
Outer Chines: 2 pieces, S4S 1" x 2", 19'-0" long
Monkey Rails, Etc.: 6 lineal ft., S2S 1", 6" wide
Transom: 1 piece, S2S 1⅛", 14" wide, 10'-0" long
Molding: 60 lineal ft., ¾" half-round
40 lineal ft., 1" half-round

White Oak

Battens: 400 lineal ft., S4S ½" x 1½"
Carlings: 2 pieces, S4S ¾" x 2", 14'-0" long
Framing: 40 sq. ft., S2S ¾", random widths and lengths (no piece to measure less than 6" wide and 6'-0" long)
Deck Beams: 20 sq. ft., S2S ¾", random widths and lengths (no piece to measure less than 8" wide and 6'-0" long)
Floor Timbers: 10 sq. ft., S2S ⅞"
Breasthooks, Knees, Etc.: 5 sq. ft., S2S 1"
Chines: 2 pieces, S4S 1" x 2½", 19'-0" long
Guard Rails: 6 lineal ft., S2S 1", 6" wide
Keel Batten: 1 piece, S4S 1¼" x 4", 16'-0" long
Keel: 1 piece, S4S 2" x 3", 16'-0" long
Stem: 1 piece, S4S 2" x 6", 7'-0" long

Spruce

Clamps: 40 lineal ft., S4S ¾" x 2"
Roof Beams: 50 lineal ft., S2S ¾", 6" wide

White Pine

Stopwater: 1 piece, ½" doweling, 12" long

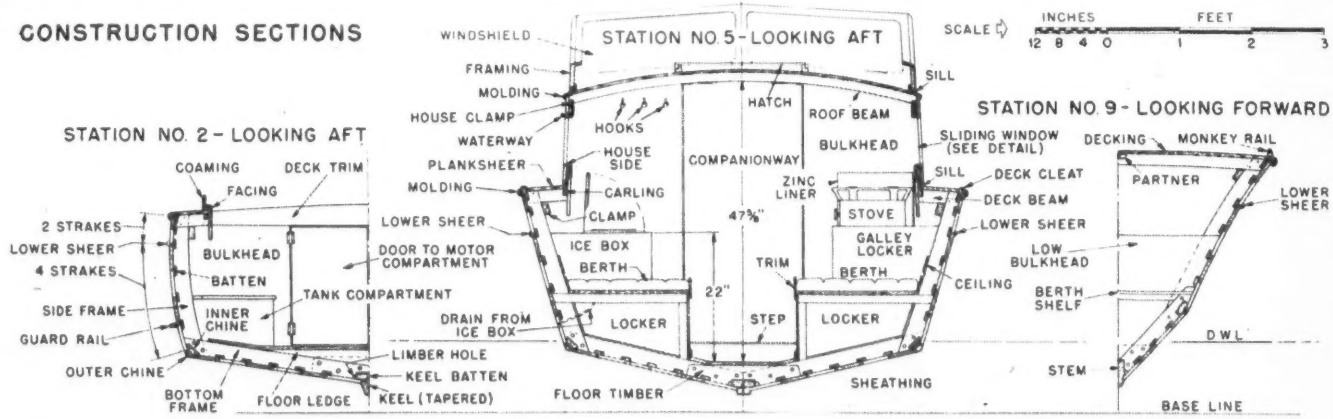
Hull Fastenings
(Bronze, brass, or hot-dipped galvanized iron)

100 machine bolts, ¼" x 2", each with a nut and two washers
12 carriage bolts, ¼" x 5", with nuts and washers
12 carriage bolts, ¼" x 6", with nuts and washers
22 gross, ⅞" No. 8 flathead wood screws
7 gross, 1¼" No. 8 flathead wood screws
4 gross, 1¼" No. 10 flathead wood screws
1 gross, 1½" No. 10 flathead wood screws
6 dozen, 2¼" No. 12 flathead wood screws

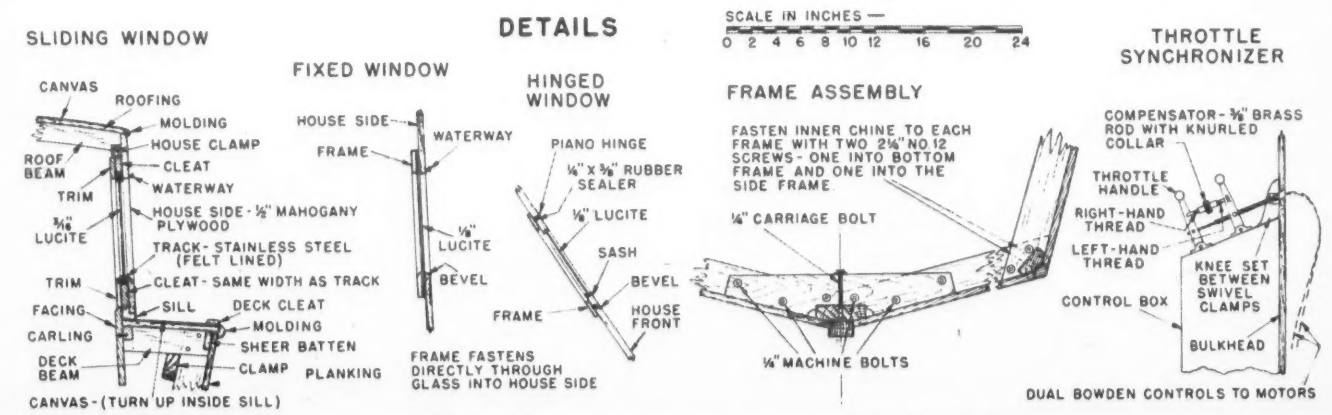
Miscellaneous

3 lb., 4-penny common nails
40 ft., 14-gauge primary wire
Lucite: 1 piece, ⅛" x 12" x 18"
1 piece, ⅛" x 18" x 25"
1 piece, ⅛" x 18" x 26"
1 piece, ⅛" x 24" x 27"
1 piece, 3/16" x 18" x 30"
10 ft., ⅝" stainless-steel felt-lined track
5 ft., rubber sealing, ¼" x ⅜"
1 "Seaclo" Junior Watercloset with one ¾" sea cock and one 1½" sea cock
5 sq. yards, 8-oz. canvas
6 sq. yards, 10-oz. canvas
1 lb., mahogany plugs, ⅜" dia.
3 dozen, mahogany plugs, ⅝" dia.
1 pint, elastic seam filler, underwater type
1 pint, putty, Duratite or equal
2 quarts, preservative, Cuprinol or equal
1 quart, nonhardening marine glue
1 pint, Cascophen glue, with catalyst
1 gallon, canvas cement
1 quart, spar varnish
2 quarts, marine paint for topsides, color to suit
2 quarts, marine paint for decks, color to suit
2 quarts, marine paint for interior, color to suit
2 quarts, marine paint for bottom, color to suit
¼ pint, boottopping paint, color to suit
1 quart, stain and filler, shade to suit

CONSTRUCTION SECTIONS



DETAILS



Free Electric Power

Here the 10-ft. impeller described below has been mounted for belt drive. Note position of jackshaft on the baseboard.

By Ernest A. Zadig

YOUR vacation cottage or outlying farm buildings can be lighted by electricity even though you may be far from a power line. The wind will gladly do this job for you—if you know how to harness it. The unit described will turn the trick for you with little manual effort and even less monetary expense.

Most people think of gales and hurricanes when the wind is mentioned as a source of power. Nothing could be more misleading, because there is vast energy even from a gentle breeze.

Anyone with ordinary mechanical skill can build this machine. And cutting the impeller blades will teach you more practical aerodynamics than you could dig out of an armful of books. (If the term "*impeller*" confuses you, a *pro*peller driven *by* the wind becomes an *im*peller.)

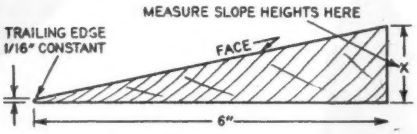
Without digging too deeply into theory, it is well to know a little about the giant which we are about to harness. It is seldom realized that the force which the wind exerts is composed of two distinct parts: a pressure and a suction. Thus a sailboat which seems to be pushed along by the wind is actually deriving most of its propulsion from the suction on the lee side of the sail. A roof in the path of a gale is lifted up, not pushed down. Consequently, the blades of the impeller must be so shaped that this suction force can aid them in turning.

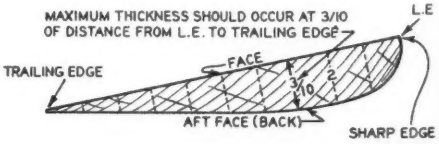
For the baseboard get a piece of oak or similar hardwood, 5½ in. wide, 50 in. long and 1¼ in. thick. Draw a centerline on the wide face of the board and do your layout from this guide. From a point 9 in. from the head and down to the end of the board the sides are tapered down to a final width of 1½ in.

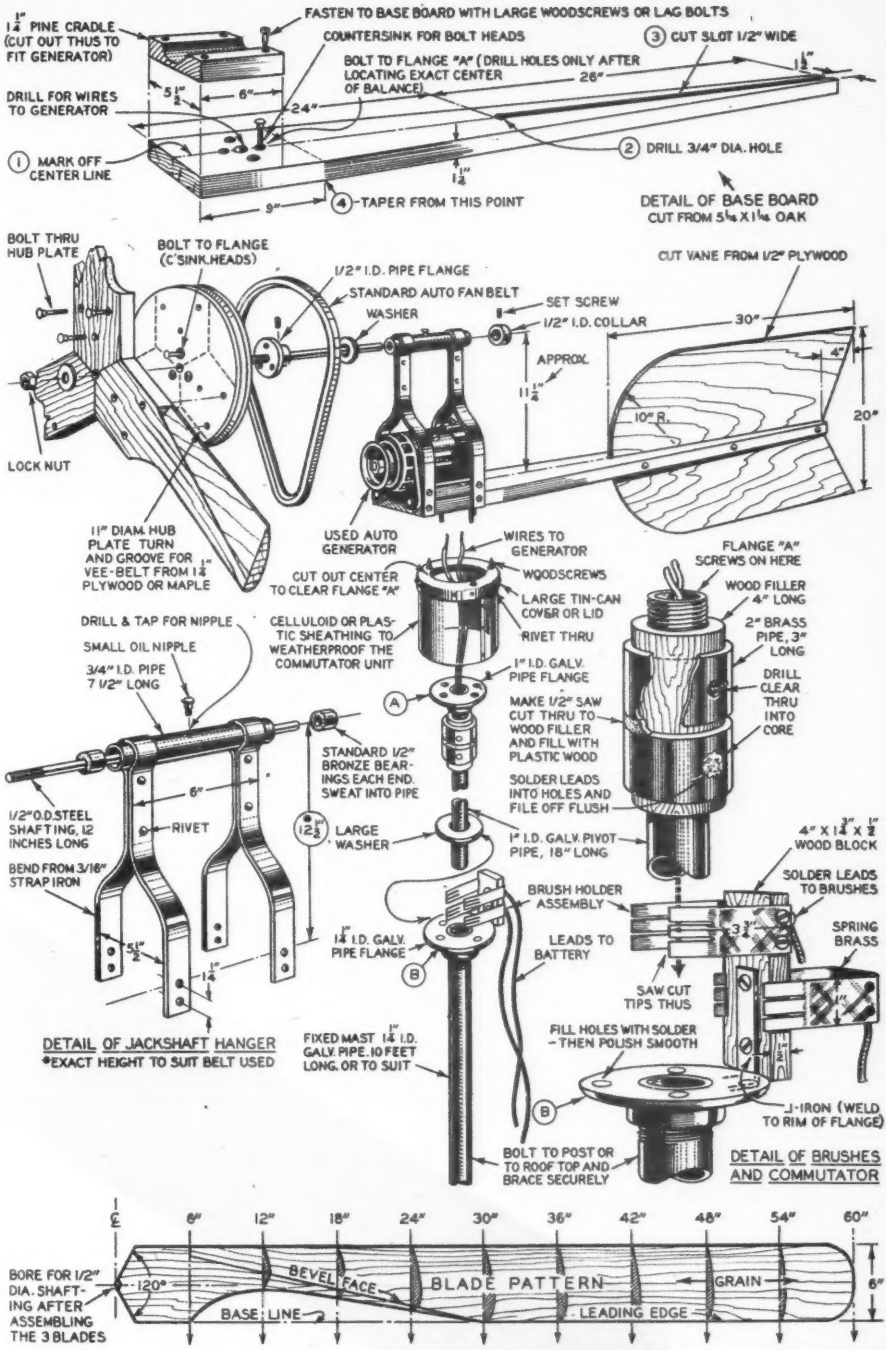
Drill a ¾-in. hole 26 in. from the tapered end and saw a ½-in. slot to meet this hole. This slot is for the tail vane. For the generator cradle a piece of wood 6 in. long and 1¼ in. thick is fastened to the full end width of the baseboard. Shape the cradle to match contour of generator used.

The tail vane is a piece of exterior-grade plywood 30 in. long, 20 in. wide and ½ in. thick with the leading edge rounded and the trailing edge notched as shown.

The commutator (or collector rings) used to connect the swinging generator with feed wires is essential [*Continued on page* 158]






1 1/4" PINE CRADLE (CUT OUT THUS TO FIT GENERATOR)
FASTEN TO BASE BOARD WITH LARGE WOODSCREWS OR LAG BOLTS
COUNTERSINK FOR BOLT HEADS
3 CUT SLOT 1/2" WIDE
BOLT TO FLANGE "A" (DRILL HOLES ONLY AFTER LOCATING EXACT CENTER OF BALANCE)
26"
1 1/2"
DRILL FOR WIRES TO GENERATOR
5 1/2"
6"
24"
1 MARK OFF CENTER LINE
2 DRILL 3/4" DIA. HOLE
1 1/4"
9"
4 TAPER FROM THIS POINT
DETAIL OF BASE BOARD
CUT FROM 5 1/4 X 1 1/4 OAK
BOLT THRU HUB PLATE
BOLT TO FLANGE (C'SINK HEADS)
1/2" I.D. PIPE FLANGE
STANDARD AUTO FAN BELT
WASHER
SET SCREW
1/2" I.D. COLLAR
CUT VANE FROM 1/2" PLYWOOD
30"
4"
APPROX.
11 1/4"
10" R.
20"
LOCK NUT
11" DIAM. HUB PLATE TURN AND GROOVE FOR VEE-BELT FROM 1 1/4" PLYWOOD OR MAPLE
USED AUTO GENERATOR
WIRES TO GENERATOR
CUT OUT CENTER TO CLEAR FLANGE "A"
WOODSCREWS
LARGE TIN-CAN COVER OR LID
RIVET THRU
CELLULOID OR PLASTIC SHEATHING TO WEATHERPROOF THE COMMUTATOR UNIT
1" I.D. GALV. PIPE FLANGE
A
FLANGE "A" SCREWS ON HERE
WOOD FILLER 4" LONG
2" BRASS PIPE, 3" LONG
DRILL CLEAR THRU INTO CORE
MAKE 1/2" SAW CUT THRU TO WOOD FILLER AND FILL WITH PLASTIC WOOD
SOLDER LEADS INTO HOLES AND FILE OFF FLUSH
DRILL & TAP FOR NIPPLE
SMALL OIL NIPPLE
3/4" I.D. PIPE 7 1/2" LONG
STANDARD 1/2" BRONZE BEARINGS EACH END. SWEAT INTO PIPE
6"
1/2" O.D. STEEL SHAFTING, 12 INCHES LONG
RIVET
12 1/2" LARGE WASHER
1" I.D. GALV. PIVOT PIPE, 18" LONG
4" X 1 3/4" X 1/2" WOOD BLOCK
BEND FROM 3/16" STRAP IRON
BRUSH HOLDER ASSEMBLY
SOLDER LEADS TO BRUSHES
3 1/2"
5 1/2"
1 1/4"
1 1/4" I.D. GALV. PIPE FLANGE
B
LEADS TO BATTERY
SPRING BRASS
SAW CUT TIPS THUS
1"
DETAIL OF JACKSHAFT HANGER
*EXACT HEIGHT TO SUIT BELT USED
FIXED MAST 1 1/4" I.D. GALV. PIPE, 10 FEET LONG, OR TO SUIT
FILL HOLES WITH SOLDER - THEN POLISH SMOOTH
1/2"
B
J-IRON (WELD TO RIM OF FLANGE)
BOLT TO POST OR TO ROOF TOP AND BRACE SECURELY
DETAIL OF BRUSHES AND COMMUTATOR
℄
6"
12"
18"
24"
30"
36"
42"
48"
54"
60"
BORE FOR 1/2" DIA. SHAFTING AFTER ASSEMBLING THE 3 BLADES
120°
BEVEL FACE
BLADE PATTERN
GRAIN
6"
BASE LINE
LEADING EDGE

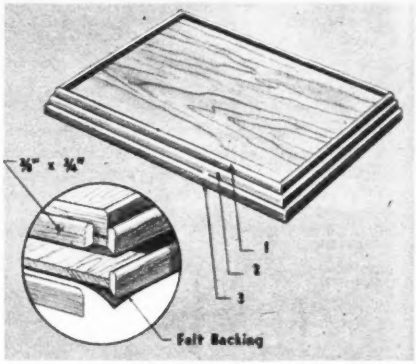
nested trays

Compactness and convenience are embodied in this triple project.

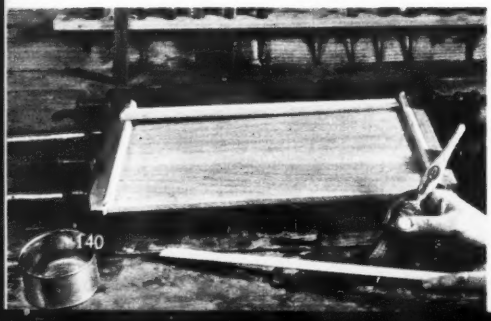
By Andrew Takas

YOUR hampered hostess will go for these sleek trays that are sure to make party service a joy. You'll note that they fit into each other, thereby solving a storage problem. I used ⅜ in. birch-faced plywood for the bases and cut edging strips ⅜ in. wide from a solid birch plank ¾ in. wide. However, you may use any type of lumber you may have around, and might want to use a darker, contrasting wood for the edging in order to gain an interesting effect.

The dimensions of the plywood bases are as follows: 9⅞ by 15⅞ in. for the first tray, 10¾ by 16¾ in. for the second one, and 11⅝ by 17⅝ in. for the third. Since the edging strips are rabbeted $\frac{3}{16}$ in., you can compute the over-all dimensions of each tray by adding ⅜ in. to the size of the respective bases.



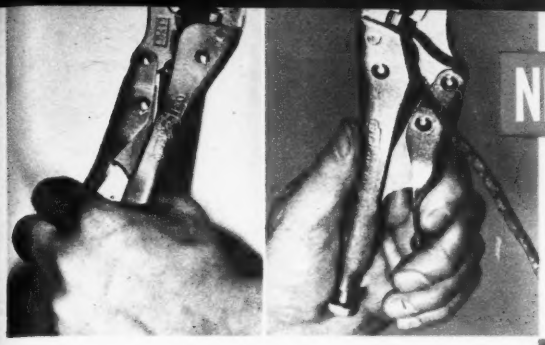
Gluing up the edging strips. No nails or screws are required. Position and mark off the edging carefully before actually cutting mitered corners.



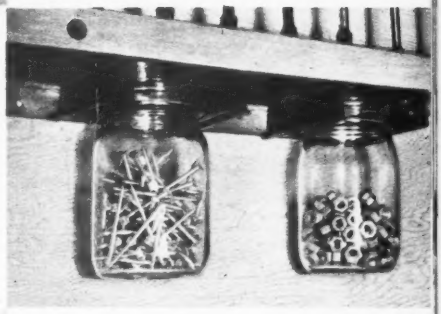
After cutting down the bases to size, make the edging and the rabbets, which are $\frac{3}{16}$ in. wide by ⅜ in. high. Round off the strips with a file and sand smooth. Miter to fit base. Apply glue to all adjoining surfaces and clamp work together.

The trays should be finished off with shellac or clear lacquer brushed on or sprayed. When dry, apply furniture wax to help offset the effect of wet glasses. •

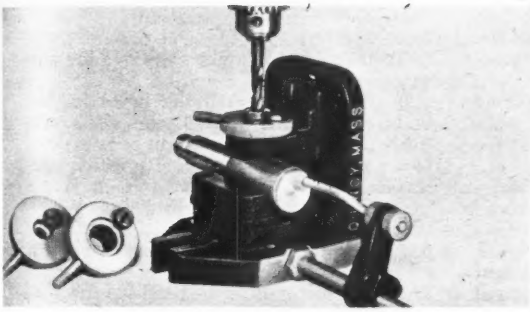
NEW for the SHOP



New Vise-Grip plier made by Petersen Mfg. Co. of Dewitt, Neb., features a wire cutter as well as curved jaw for positive grip on nuts. Handles maintain constant distance regardless of size of the work.



Jiffi-Klip shop shelf is designed to accept four pint-size Mason or fruit jars for storing small parts. Jars are held in place, without screw tops, by means of a special expanding bracket. Manufactured by Colper Sales Co. of Wichita, Kan.

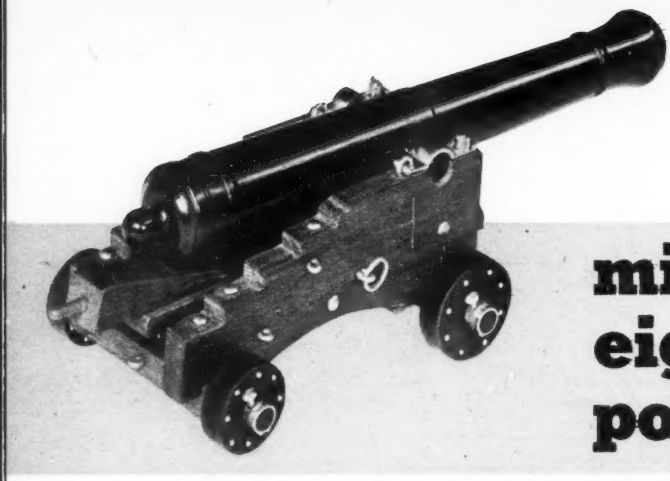


Adjustable drill press jig made by Mathewson Machine Works of North Quincy, Mass., is used for drilling holes through round stock. Hardened block accepts material up to 2 in.

Spiral-shaft screwdriver made by Stanley Tools has a hollow Tenite handle for storing bits and drills. New button release chuck securely holds bits.

Dial calculator shows wood characteristics, nail and screw sizes, board measure and similar information. Made by Greenlee Tool Co., Rockford, Ill.

Single prod tester shows whether electrical outlet is alive by means of a glowing neon lamp. Made by Robert Palmer of Hickman Mills, Mo.



miniature eighteen-pounder

By Winthrop Pratt, Jr.

PLANS for this realistic model were developed from actual specifications used in designing American ships' guns and carriages during the early part of the last century. The carriage plan was drawn from notes of Samuel Humphry, naval architect; measurements for the gun itself, a long eighteen-pounder brass cannon, were scaled from ordnance books in use at the time.

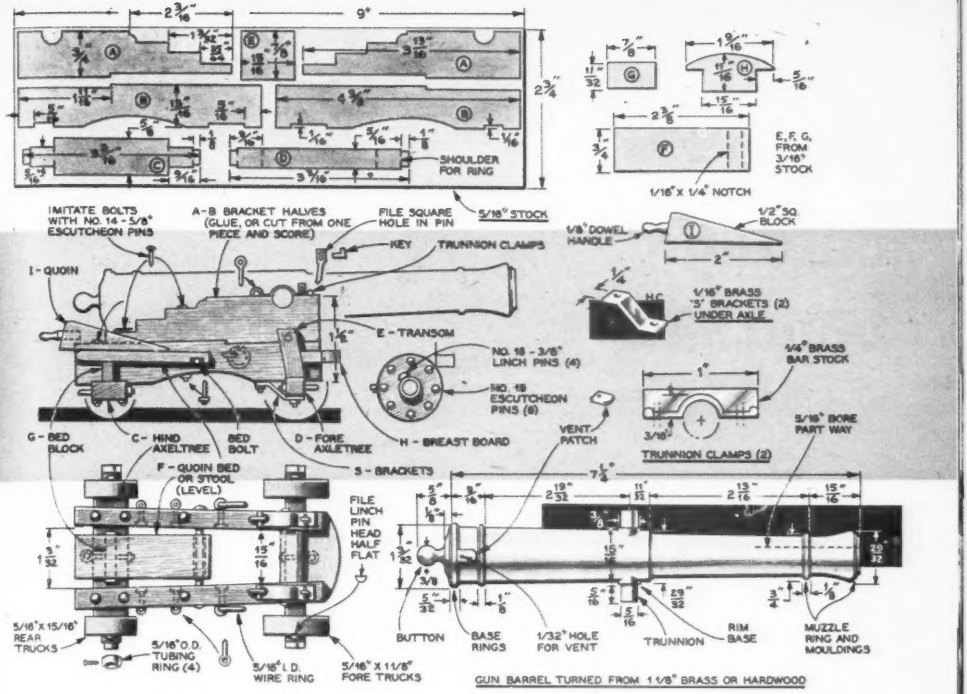
The barrel is turned from 1⅛-in. diameter brass rod. The hole for the trunnions may be drilled at right angles to the longitudinal center before turning the taper, or later on—provided you have some means of holding the work so that the longitudinal center is exactly horizontal. The drill used should be small enough to allow a drive fit. The bore is $\frac{5}{16}$-in. diameter, but it is not necessary to bore it out more than an inch or so. The vent patch can be silver-soldered onto the gun, or it can be riveted with small brass escutcheon pins countersunk and then filed smooth.

The brackets or sides of the carriage must be cut from $\frac{5}{16}$-in. stock, and should be 4½ in. long in the rough, as they are spread apart at the hind ends. The front and rear vertical edges have to be cut at right angles to the center line of the carriage. When so trimmed their lengths on each face will be 4⅜ in. The height of the sides is 1½ in., but if you make them in two parts the upper one must be $\frac{13}{16}$ in. and the lower one ¾ in. high.

When building them up this way the upper and lower pieces should be glued together at the joint before any bolt holes are drilled, and the grain of the wood should be of varying pattern to show the joint. However, the sides may be made from one piece and the joint scored in. Note that holes for the eyebolts and ringbolts are drilled at right angles to the side surface.

It is difficult to drill the holes for the bolts which pass through the sides vertically, but it is not absolutely necessary to do so. For the three bolts which pass through the "steps" No. 14x⅝-in. brass escutcheon pins may be substituted. Where they come through on the bottom, you can use the same pins with the heads cut off, a hex nut threaded on, and then driven in. The same method can be used for the bottom ends of the eyebolts and joint bolts in the clamps. The upper end of the joint bolt can be made from a No. 6x¾-in. roundhead brass wood screw with the head sawed off and the shank filed rectangular. The slot for the key is made by drilling two

All parts ready for assembly. Ebony, maple, or birch may be substituted for the 1⅛-in. brass rod which was used for the barrel in this instance.



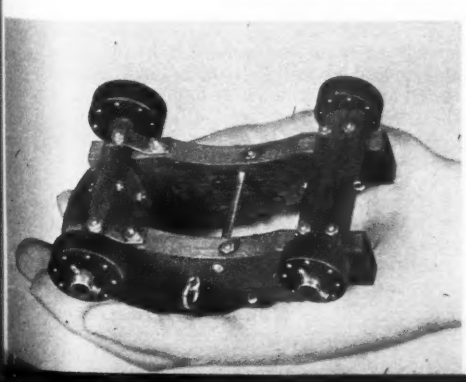
holes with a No. 58 or 60 drill and filed to shape. Drill and turn in with a pair of pliers.

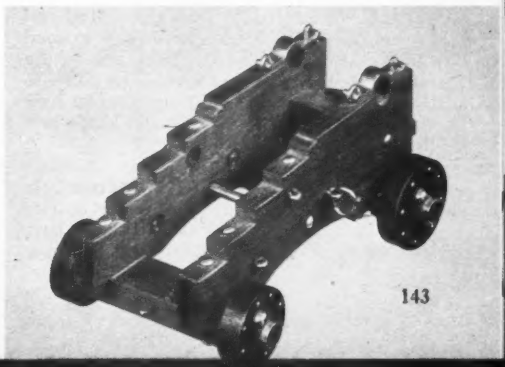
Locate the centers for the bed bolts on the outer surface of each side and mark with an awl, but do not drill until the carriage has been assembled.

The success of the carriage depends upon the accuracy of the axletrees. The fore axletree is $\frac{5}{16}$ in. square and $3\frac{3}{16}$ in. long. Mark the exact center of its length on the upper hind edge and place another mark at exactly $\frac{15}{32}$ in. each side of this center, making the total $\frac{15}{16}$ in. between the outside marks. The hind axletree is $\frac{3}{16}$ in. thick, but $\frac{5}{8}$ in. wide, and a center line must be drawn on its upper surface through its entire length. Locate the lateral center upon this center line, and measure off on each side a distance of 35/64 in., making the distance between the two outside marks $1\frac{3}{32}$ in. which is equal to the over-all diameter of the gun at the base ring.

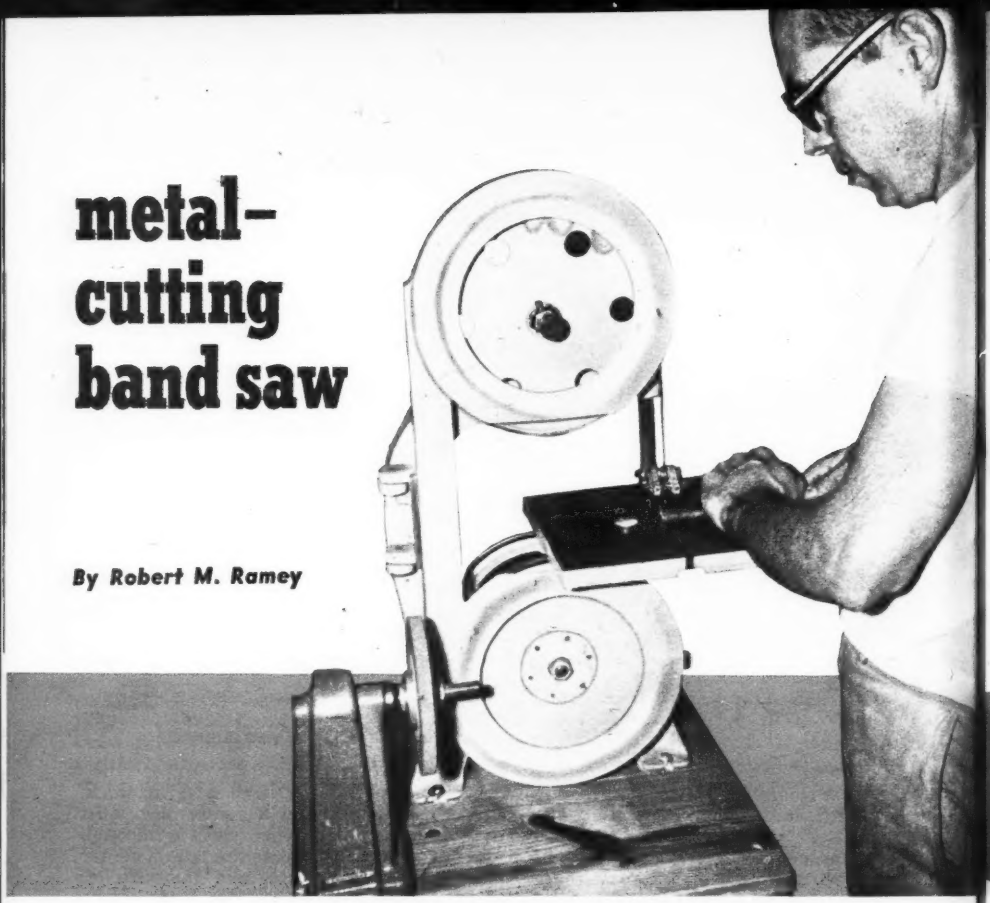
Now lay the two axletrees exactly 3¼ in. apart, center to center and exactly parallel to each other. Lay a straightedge across the two axletrees [*Continued on page* 184]

Left: Inverted carriage unit shows position of the bed bolt and retaining brackets. The truck, or wheels, may be turned from wood. Right: Carriage in position before adding barrel.





metal-cutting band saw



By Robert M. Ramey

USING one of the metal-cutting band-saw blades developed for industry, you can handle all sorts of materials up to and including ½-in. steel plate on your home-workshop band saw. The materials are cut in the same manner as wood, but not as fast. The whole trick is to use a blade with special, hardened teeth and to run this blade at a speed that will not overheat the teeth and thus destroy their hardness.

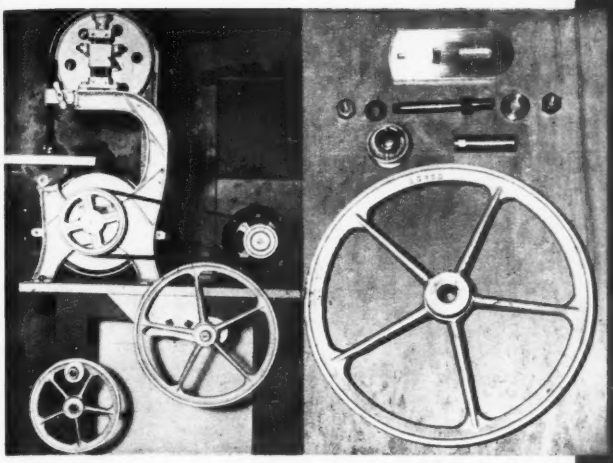
A metal that requires a great deal of power to cut, steel for example, must be worked slowly so the heat generated can be dissipated. It is also necessary to feed the metal forcefully into the blade so the teeth cut instead of scraping. The limit to the thickness you can cut depends on how rigidly your saw will guide the blade and the force you can put against it.

Blades that will cut all the materials listed on the chart at the end of this article can be purchased from mail-order houses or tool suppliers. They come in either long lengths to be cut and spliced by the user or in endless blades to fit your saw. Their cost is about the same as that of wood-cutting blades.

The author uses a long-length type, ten teeth to the inch, ¼ in. wide and .025 in. thick, cutting it to the proper length and splicing it with a silver-soldered scarf joint. Although this blade is satisfactory for all the materials shown on the chart, a finer-tooth blade will give better results and a faster cut if sheet metal less than 1/16 in. thick is to be cut in any quantity.

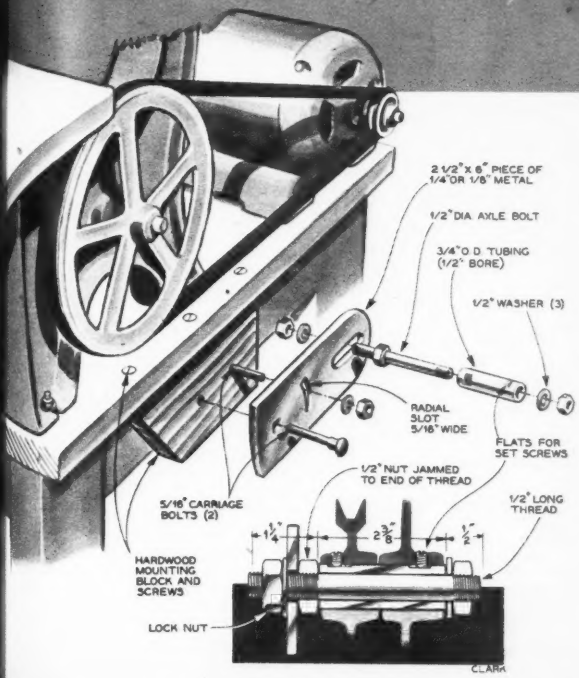
The chart shows approximate blade speeds used for the materials listed. Thin stock could advantageously be cut at higher speed and heavy stock at lower speed, but the speeds given are generally satisfactory.

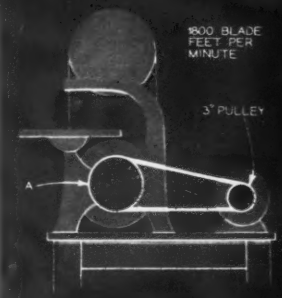
It is necessary to use a jack shaft to obtain sufficient reduction of a standard-speed motor to cut some of the materials. This shaft consists of a ½-in. rod, threaded on each end as shown in the sketch, and a piece of brass tubing. Purchase pulleys with ¾-in. bores [*Continued on page* 185]

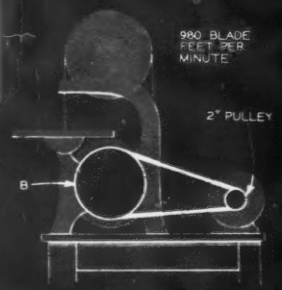


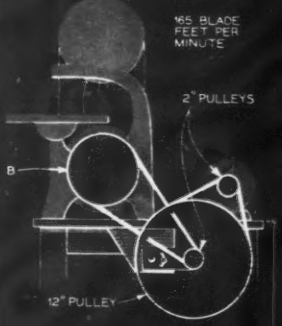
To obtain the reduction of blade speed needed for cutting the harder and thicker metals, it is necessary to employ a jack shaft with a large and a small pulley mounted on it.

With the proper blade and reduced speed, you can cut metal on your own band saw.







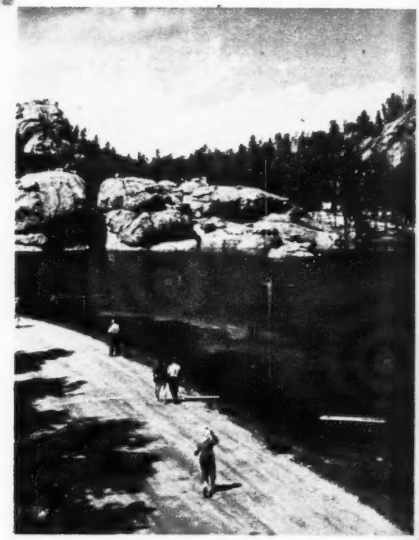


MONTHLY

PHOTO CONTEST

First Prize ($10.00).....Roustabout
Photographed in the late afternoon sun by Harvey Fondiller of New York City.

$5.00 Award.....Young Farmer
Zane Altenburg of Kings, Ill., took this shot through a dark yellow filter to darken the sky.



$5.00 Award.....Promenade
A Ciroflex camera was used for this photo taken by Don Schone of Sturgis, S. D.

$5.00 Award.....Bronco Buster
Taken with a Speed Graphic by Richard Schaus of Phoenix, Ariz., on Super XX film; f-8 at 1/800.

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Please address your entries to: Photo Contest, *Mechanix Illustrated*, 67 W. 44th St., N.Y.C. 18

gun stock CAMERA

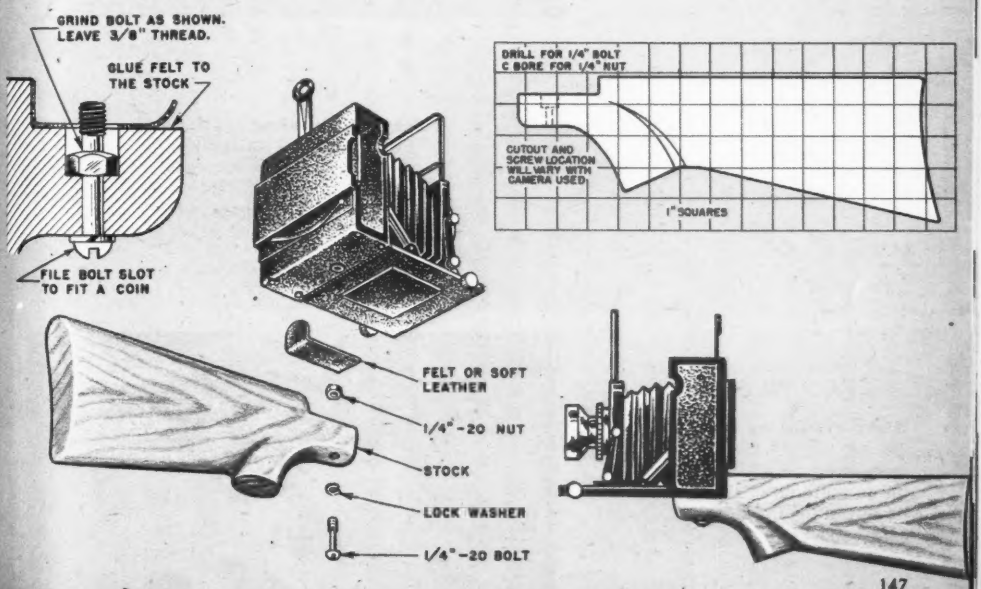
By Leo D. Harris

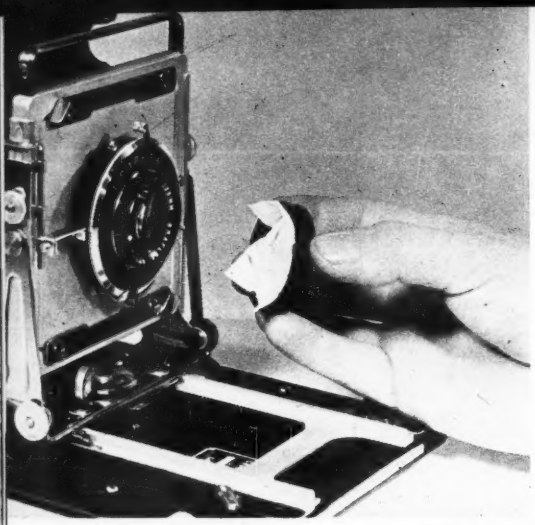
HUNTING wild life with your camera can prove to be more of an adventure than with a rifle. The challenge is greater as you must be able to get in for your shot unobserved and also get away if necessary.

By cutting down an old stock from a rifle or making a new one to the scale shown below, you will not only enjoy your hunting more but it will help you take better pictures by steadying your camera.

Place the stock against your shoulder and sight through your sport finder and you will be able to shoot wild life even in full flight.

Aside from the gun stock, the only other materials that are needed are a ¼-in. 20 bolt, a ¼-in. lock washer, a ¼-in. 20 nut and a piece of soft felt. •

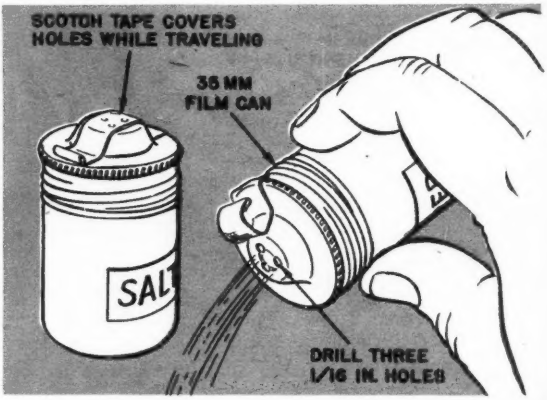


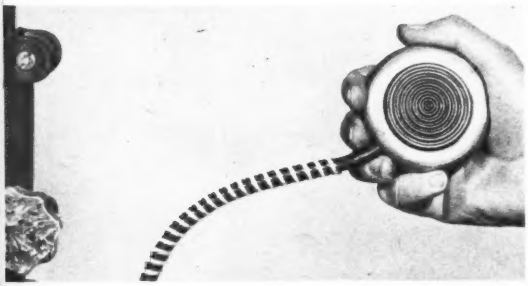


Lens cap provides handy storage compartment for lens cleaning tissue. The lens cap will usually be able to hold one or two of the tissues and still fit snugly over the lens of camera.

photo handies

Cans from 35mm film can be made into durable, long lasting salt and pepper shakers by simply punching a few holes in each cover. Scotch tape will prevent spilling while packed for travel.



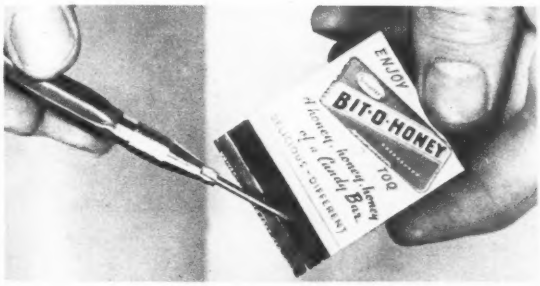


Protect wire leading from enlarger foot switch by using a plastic cord cover similar to those used to protect telephone wires. It will help prevent short circuits and lengthen cord's life.

Old envelopes never die. By cutting off the corners of used envelopes and gluing them to photo stiffeners as shown in the photograph on the right, your prints are protected in mailing.

Storing solutions in small bottles has a few advantages. Most important, all of the solution is used at once in the case of developer and there is no chance for oxidation and the bottles are easier to handle.

Bottle labels have a habit of washing off and leaving you in the dark. This can be avoided by applying a thin coat of clear nail polish over the labels. Polish remover will always enable you to change the labels.



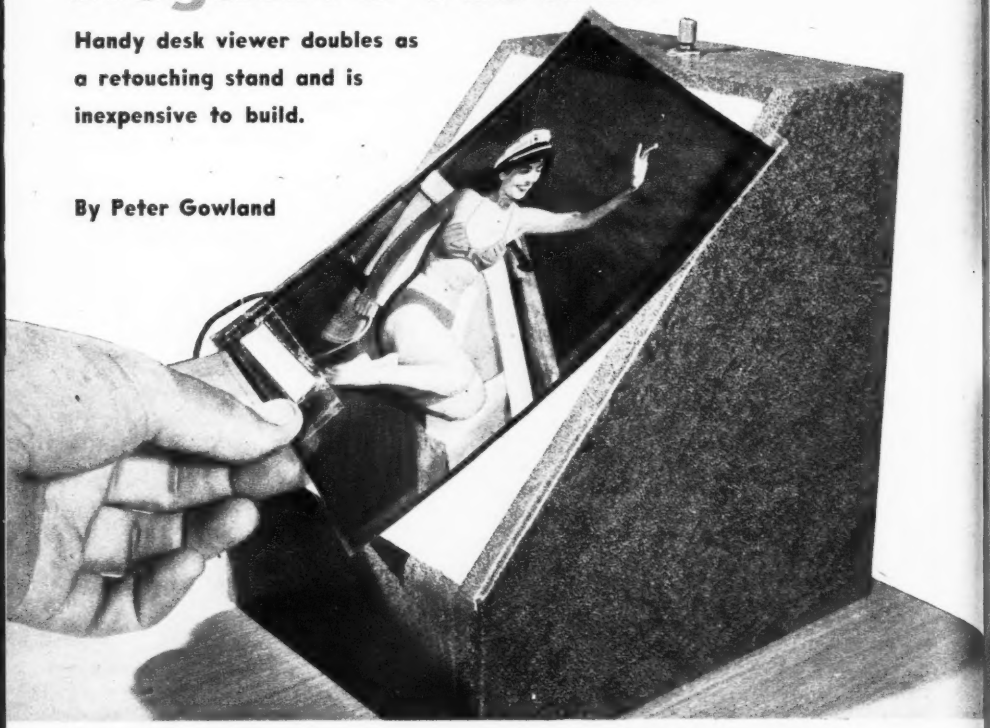
Retouching leads can be sharpened in emergencies by using the abrasive part of a book match cover. The fine texture of the abrasive permits you to obtain a sharp point which of course is an asset in retouching.

Exposed film holders can be quickly and easily recognized by marking one side of each film slide with a large X. Silver model airplane dope will stand out brilliantly against the dark slide and it will not wear off.

Negative Viewer

Handy desk viewer doubles as a retouching stand and is inexpensive to build.

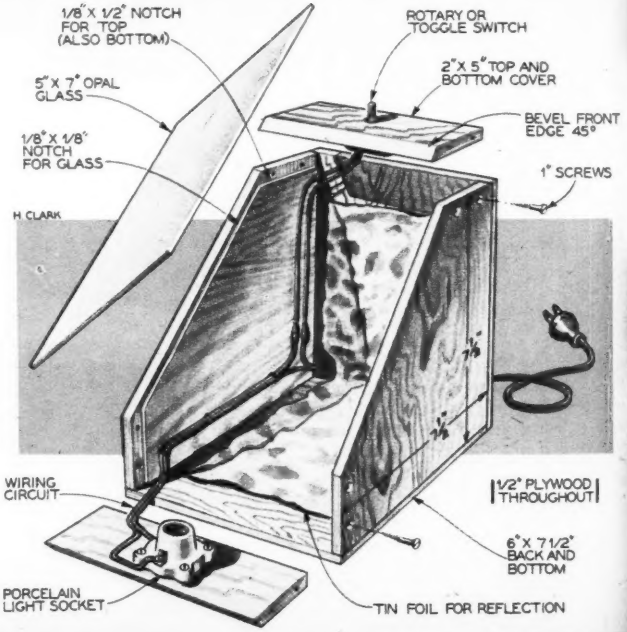
By Peter Gowland

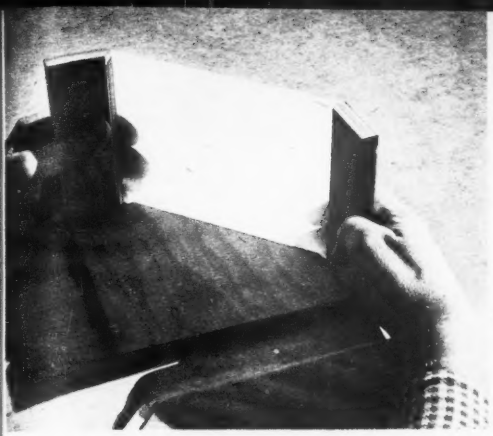


FOR under $2.00 and in no more than a few hours, you can make this viewer that is handy for viewing both negatives and color transparencies. It is also useful as a retouching stand.

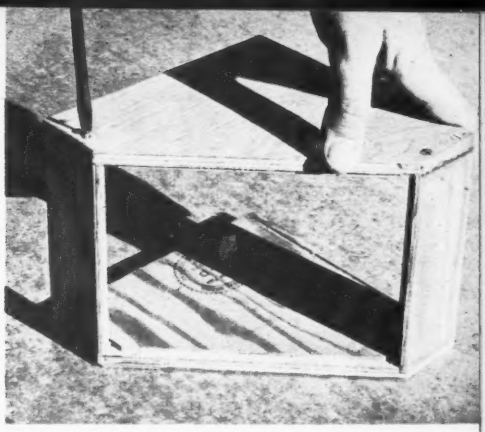
The plastic or leather can be obtained at an auto top store, the socket, switch and screws and possibly the glass at a hardware store; more than likely the wood can be dug right out of your scrap pile.

The whole unit is easily put together as shown in the photos on these pages. •

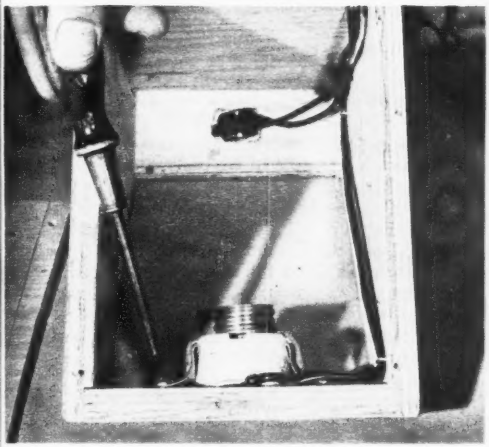




Ground or opal glass should fit firmly into rabbets cut in the ½-in. plywood. They should be cut just deeply enough to allow the glass to lie flush.



Pilot holes for the wood screws should be drilled and countersunk. Do not glue until the inside is all finished and you are ready to insert the glass.

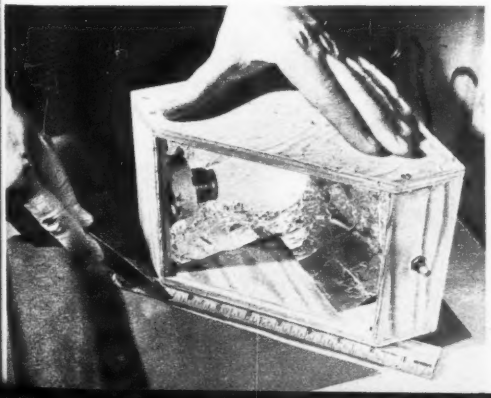


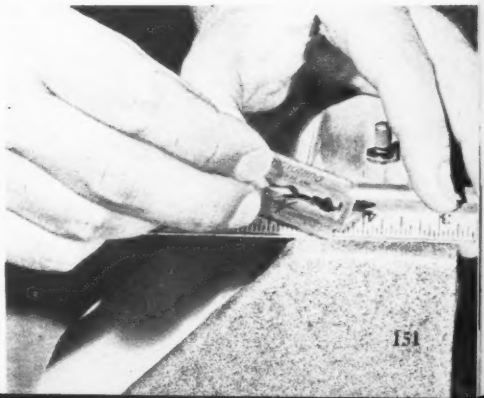
The light socket is held in place by using a pipe clamp cut in half. The small light switch is placed on the rear of the box and wired to the lamp socket.

Tinfoil, crinkled to give good light diffusion, is either glued or taped completely around the inside of the box. Use a single sixty-watt bulb.

Plastic or leather is used to cover the box. After checking all dimensions and cutting out the sides, the glass should be inserted and the box glued up.

After the box has been glued and screwed together, the final covering is applied and glued on with a good cement that will withstand the bulb's heat.





Focal Frame

By Myrlin Wieder

SHORTLY after I started making home movies I had a desire to take close-ups of flowers, nature studies and operations in my workshop so that the audience could see the very minute details of the subjects. Another of my ambitions was to title my own movies without too much trouble. So I decided to make a focal frame somewhat on the order of one I had seen on a still camera some years ago. The job was relatively easy, requiring only a few tools. The materials cost just a few dollars including the supplementary lens.

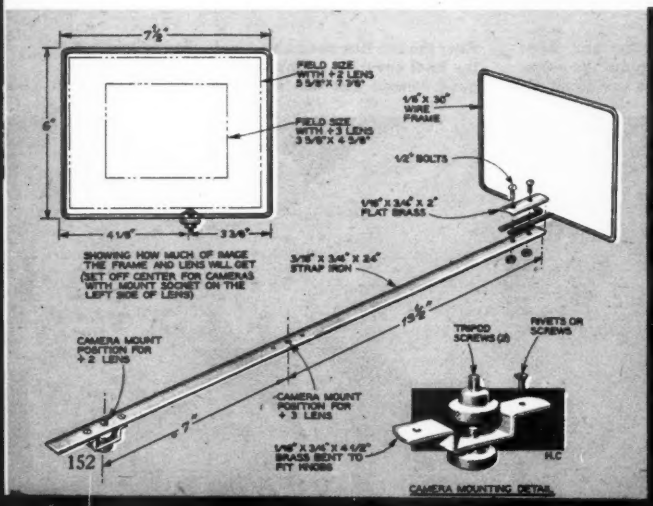
Now I can take a shot of an ant hill and when projected the ants are twelve inches long on the screen. A shot of a lathe in action shows the cutting tool fully two feet long at normal projection on a 30x40-in. screen. Titles are no longer a problem and close-ups of flowers show the swaying blossoms being sought by bees and butterflies.

Parallax is eliminated and the depth of field problem with your supplementary lens is solved. It can be used with 2 or 3 diopter lenses and by moving the camera closer to the frame, up to 7 diopter lenses can be used for close-ups.

As far as exposures go, the chart supplied by the lens manufacturer should be followed very closely.

The frame should be large enough to be outside the actual field of view and it should be painted black to eliminate glare. •

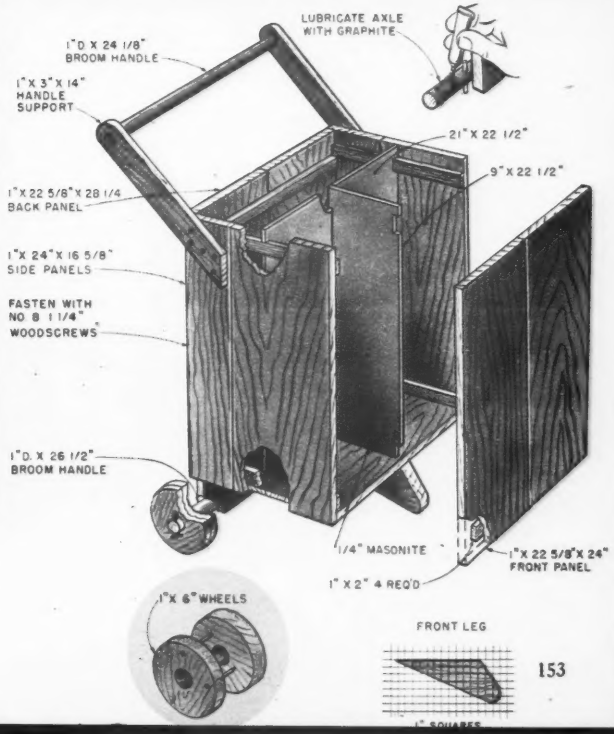
Photo below shows the framer in use as a guide for titling home movies.



Laundry Cart

EXPEDITING the weekly wash is a cinch with this sturdy cart. The three compartments make sorting clothes easier, too. Built of 1x12-in. pine, the unit may be stained or painted when completed. Wheels may be made on your band saw from scrap material. Note that each wheel is composed of two thicknesses of stock attached with the grain at right angles. The axle is nothing more than a 1-in.-diameter broomstick or dowel. Lubricate wheels with graphite rather than oil or grease; the latter will cause swelling of the wood, prevent rotation. —*Robert H. Hawkins.* •

In use with laundry chute, cart is especially useful. When not in motion, cart is kept stable by the wooden rest screwed to the bottom.

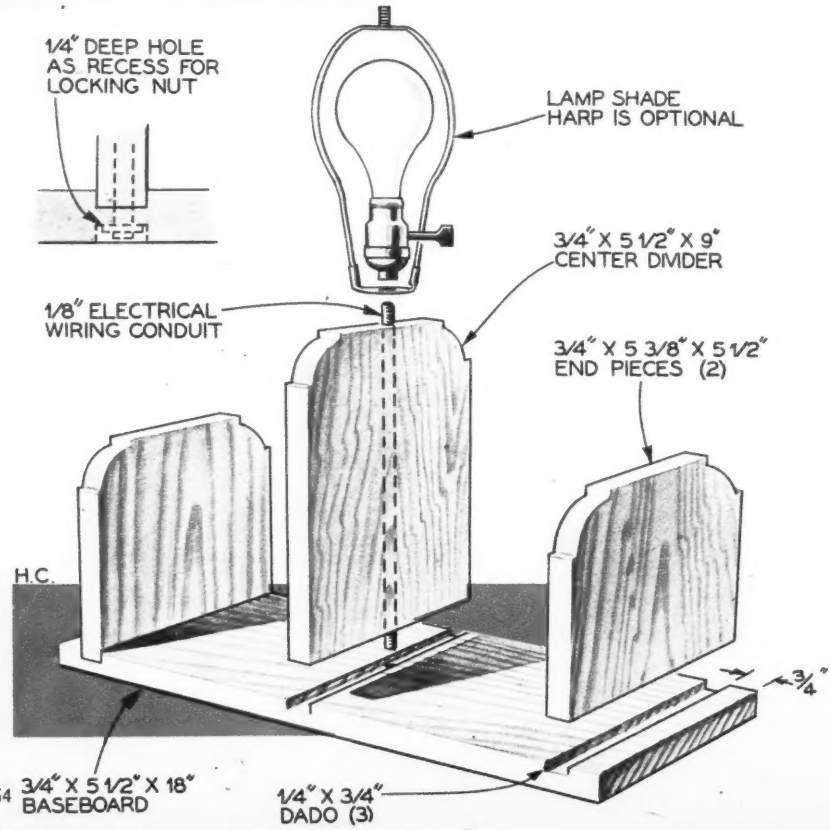


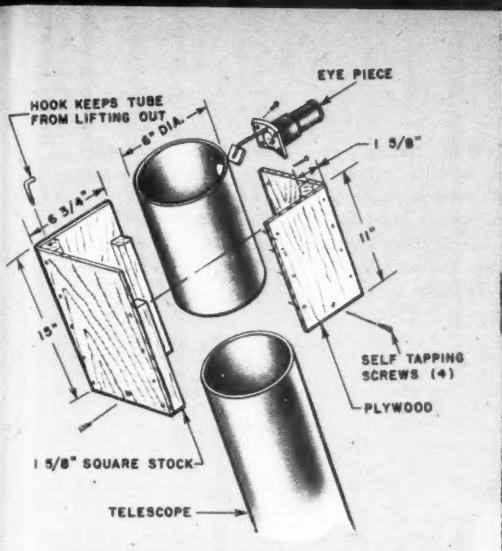
Bookcase Lamp

ONE way of making sure that your books are near a source of light is by engaging in this useful project. You may want to make your own modifications; for example, if you intend to house large books in the unit, make the center divider higher than shown so that the shade will not interfere with book space. But no matter how you might decide to alter the design, it will remain a snap to build.

Choose a wood to match your desk. Since you require very little lumber, you will probably be able to pick up enough serviceable hardwood scrap to serve your purpose. Wiring equipment may be bought in any hardware store.

—*O. S. Harrison* •





Photos by Dell Mulkey

The Amateur Telescope Maker's Page

Conducted by Robert Brightman

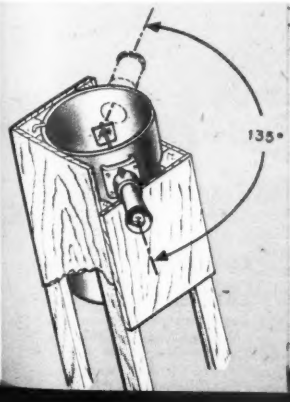
ON top of this page is a photograph of Frank E. Rattie, a grocer of Aberdeen, Wash., and his pride and joy a six-inch Newtonian telescope of 72 in. focal length.

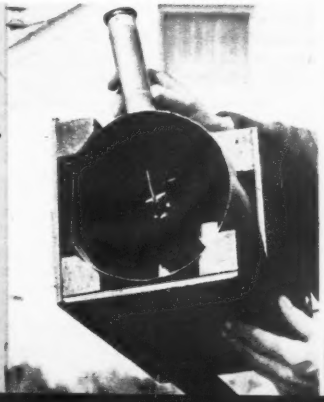
"H'm," you may murmur, "nothing unusual about *that*." But, if you will look closely you will see that there is something unusual here. A rotating eyepiece holder. Something to avoid that unavoidable crick in the neck to which so many backyard astronomers are subjected to when observing through their telescopes. Such a state sometimes occurs when the instrument is unduly long and the telescope is pointed at a star near the horizon or near the zenith.

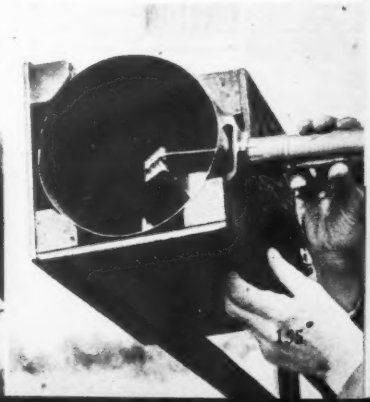
Mr. Rattie has solved this problem, and has solved it very neatly indeed—a rotating eyepiece adapter! It is made out of a piece of stove pipe, 7 in. in diameter and 8 in. long. This fits into another section of tubing slightly larger in diameter so that the eyepiece adapter can rotate smoothly without binding. The telescope itself is of the open frame type and is made chiefly of plywood. No matter how the eyepiece is turned, it will always be perpendicular to the prism, for the prism, and the eyepiece adapter turn as a unit. [*Continued on page* 190]

The eyepiece of Mr. Rattie's telescope can traverse an angle of 135° without disturbing any other optical or mechanical parts of the telescope.

The rotating part of the eyepiece adapter consists of a length of stove pipe 8 in. long which fits snugly into the main tube of the telescope.





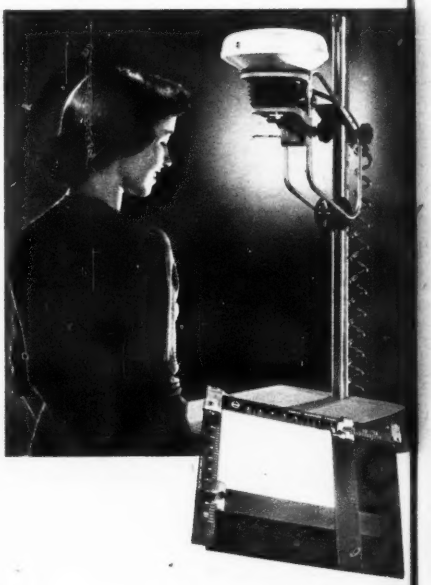


Ideal for beginners—Kodak Hobbyist Enlarger, only $49.50, is offered complete with lens. New cold light protects your negatives—flashes on at the touch of a button attached to the cord. New negative carrier simplifies loading of negatives up to 2¼x3¼ inches. Compact, light, the Hobbyist is ideal for use where space is limited.

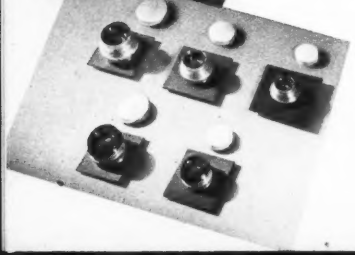
HOW TO MAKE DARKROOM DREAMS

Ever daydream about setting up a darkroom? The Kodak equipment shown on these pages can help make those dreams come true. It's such wonderful fun to develop, print, and enlarge your own pictures . . . and quite simple, too. And the expense need not be great. Let your Kodak dealer help start you off. Or, if you already have a darkroom, he'll be glad to suggest ways to improve it. His professional knowledge can probably save you time and money in the long run. Be sure to see him soon.

Designed for salon quality—Kodak Flurolite Enlarger gives even, fast, high-contrast illumination with integrating-sphere light source. Focusing and elevating knobs may be used at the same time. Rotary negative carrier for easy loading. Lighttight cabinet in base for paper storage. With accessories, quickly converts to view camera for copying, cine titling, photomicrography. $112.50 (without lens).



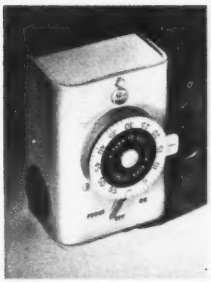
New Kodak Enlarging Ektanon Lens, 50 mm. f/4.5, for the "Flurolite" and other enlargers. All elements are Lumenized. Iris-type diaphragm with click stops down to f/16. $15.75



Other Kodak enlarging lenses for the Flurolite range up to Kodak Enlarging Ektar Lens, 4-in. f/4.5, for negatives up to 2¼x3¼. Prices from $25.75

Kodak Masking Easel, 11x14, masks prints up to 11x14 inches, adjusts for ¼- to ¾-inch margins. Design assures right angles, facilitates one-hand loading. $11.25

Time your work up to 60 minutes—Kodak Timer with tilting base. "Start-and-stop" switch permits stopping without resetting hands. $6.75



Controls printing time to the second—Kodak Electric Time Control. Automatic, 1 to 57 seconds. Printer or enlarger plugs into control. $13.50

Keep your hands free—Kodak Utility Footswitch leaves your hands free to handle equipment. Safe neon light glows through slots to mark location. $10

A safelight lamp is a "must"—Popular Kodak Adjustable Safelight Lamp above is $8.25; bracket, $.60. (Brownie Darkroom Lamp, Model B, only $1.15.)

COME TRUE

Dry your prints quickly, without curling—The Kodak Blotter Roll allows for free circulation of air for rapid drying. Capacity —60 prints of average size. $2.75

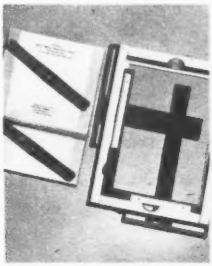
Complete kit for prints, only $4.85—Kodacraft Printing Kit. Trays, printing frame, Velite Paper, chemicals, graduate, thermometer, stirring rod, instruction book.

Everything you need to develop and print—Kodacraft Photo-Lab Outfit includes new Kodacraft Roll-Film Tank, trays, printing frame, chemicals. $8.50

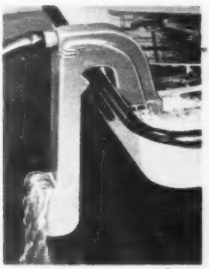
Complete outfit, including metal printer and roll-film tank—Kodacraft Advanced Photo-Lab. Also contains everything else included in kits at left. $13.95

For roll-film developing—Kodacraft Roll-Film Tank. After loading, can be used in lighted room. Takes 620, 120, 616, 116, and 127 films. $2.95

For contact printing—Kodacraft Printing Frame. Includes glass plate, masks for 9 popular negative sizes. Accepts paper up to 4¼x5½ in. $1.50



Takes negatives up to 4x5½ in.—Kodak Auto-Mask Printing Frame. Graduated scales on 2 sides give even margins and serve as paper guides. $3.25



Wash film and prints in tray automatically—Kodak Automatic Tray Siphon attaches to water tap. Water is siphoned out at same speed at which it enters. $5.25

Prices subject to change without notice and include Federal Tax where applicable.

Your Kodak dealer will be glad to demonstrate this equipment for you. See him for *all* your photo needs.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Kodak

Free Electric Power

[*Continued from page* 138]

for proper operation. To make it, get a piece of 2-in. brass pipe 3 in. long, a piece of wood with 2-in.-square and 4 in. long, and an 18 in. length of 1 in. galvanized iron pipe threaded at one end. Trim the wooden block into a cylinder that fits snugly into the brass pipe. Drill a 1¼-in. hole lengthwise through this cylinder true to the centerline.

Soap the threaded end of the galvanized pipe and drive it through the hole in the wood until it extends far enough in the floor flange.

To engage the two insulated collector rings, cut two ½-in. sections from the brass pipe and connect these to encompass the wooden cylinder. Fill the space with Plastic Wood and trim flush. Drill holes through each brass ring and the galvanized pipe to take the insulated wires from the generator. Solder the ends of these wires in the brass holes and file the outside surface smooth.

The brush holder is fastened to the edge of the 1¼-in. galvanized floor flange. This floor flange is the top end of the 1¼-in. galvanized pipe which serves as the mast. Its upper surface should be ground smooth to ease the generator's swing into the wind.

The auto generator, available at any auto graveyard, should preferably be one from any of the large, older cars, since its output capabilities will be higher and its price lower.

The jackshaft assembly and its strap iron supports are now made. A bronze bearing is soldered into each end of a 7½-in. length of ¾-in. brass pipe. Align the bearings with the shaft before soldering. The brass pipe acts as an oil reservoir and a small hole is drilled so that it may be filled.

The hub plate to hold the three blades is an 11-in. circle of 1¾-in. exterior-grade plywood, or maple. Center it accurately on the end of the jackshaft and fasten securely with a flange and stove bolts. Cut a vee for a belt into the hub plate edge. Adjust the height of the jackshaft above the base to take a standard automobile fan belt connecting hub plate and generator pulley.

The impeller of this generator is ten feet in diameter and has three blades. It will make about 200 revolutions per minute in an eight-mile-per-hour wind.

To assemble the impeller, obtain three pieces of straight, knot-free, well-seasoned wood, each 60 in. long, 6 in. wide and 1¼ in. thick. Lay them on the bench side by side, with grain running away from you and mark the top of each piece "face" and bottom "back." Draw a squared line across each board at six-inch intervals and mark each line with its distance from the preceding line, as 6 in., 12 in. and so on. To make your task easier, cut cardboard templates corresponding to degrees of slope that will fit the finished blades at the proper points.

Cut the face of the blade first. This is a flat surface but of continuously changing angle with respect to the original face of the board. The trailing edge is always $\frac{1}{16}$ in. thick. The sloping face intersects the top of the board up to the 30 in. line and new leading edge is cut along this distance.

To cut the blades clamp the hub of the blade flat to your bench with the tip extending straight out. Stand to the right of the blade and draw a sharp drawknife toward you until the approximate contours are reached. Fasten the three blades to the hub plate with carriage bolts using three for each blade.

For the impeller to run without vibration it must be carefully balanced and the jackshaft (if it runs true and free) can be used as a balancing rig. Remove small shavings from the heavy blade until the impeller comes to rest at a different point each time it is given a light spin.

With the entire wind-electric generator assembled, including the impeller, find the center of balance of the baseboard and attach the 1-in. floor flange above the commutator at this point. Center of balance is that point about which the entire unit balances itself fore and aft.

To protect all wooden parts against weather, soak generously with linseed oil or coat with outdoor paint.

The 1¼-in. pipe should be well braced. If guy wires are used, make sure that they do not hinder the rotating blades.

Mount the generator in place by slipping the 18-in. length of 1 in. pipe below the commutator into the mast. Brushes will then make contact with rings of the commutator.

The feed wires to the unit are attached to the two spring brass brushes with the wiring exactly like that in your car. The cutout (to disconnect the generator from the battery when it is not charging) is the standard automobile type and may be left mounted on the generator or may be placed near the battery.

You will also need an ammeter and a protective fuse. Mount them on a plywood panel 6x8 in. A small six or eight-volt radio panel bulb will show at a glance when the generator is charging.

If you use a six-volt generator a standard automobile storage battery will be enough to store juice during calm periods. For higher voltage systems several units of auto batteries may be connected in series. •

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[*Continued from page* 126]

braked car wiggles snake-like to a precarious stop or seems to follow an invisible chalk mark depends on a number of things that are apt to be overlooked. On some cars, it depends on conditions that drivers think have nothing to do with the brakes. A perfect example is too much slack in the steering wheel. This will cause the car to pull to one side when braked. Tires are quite an item in upsetting equalization. Those on opposite wheels must be given the same pressure. They must have not only the same tread pattern, but the same depth of tread. Any tire with a bald tread will encourage the wheel it is on to lock. A weak front spring will cause a one-way pull during braking; so will loose wheel bearings.

Several months ago, a back-alley car butcher used the wrong kind of grease for the front wheel bearings on a customer's car. In melting, the grease got through the retainers and made the front brakes fade. Fortunately, the owner discovered this before the grease started to "cook" on the linings. That would have caused dangerous grabbing.

A friend of mine operates a car equipped with a kick shackle on the left front spring. He drew this up too tightly one day and found to his surprise that whenever he stopped, the car pulled to one side.

A downward dipping of the car's front end when the brakes are firmly applied is normal, but if it is too pronounced, you're right in suspecting that the front shock absorbers are not doing a good job. Weight normally tips forward during a he-man stop, and the smart driver remembers to dab (pump) the brakes rather than to hold the pedal down firmly; but if the shock absorbers are weak, broken, or in need of fluid, the car will rock badly. This interferes with normal contact between tires and the road surface. It's even worse if you brake the car when coming downhill.

Mechanics will back my statement that incorrect adjustment of brake shoes is the most common cause of unequal braking, squealing, and grabbing. Minor adjustments are made in accordance with the particular type of brake used. Some hydraulics are single-anchor jobs, and some are double. One system may have an eccentric while another has none at all or perhaps one eccentric for each shoe. Then there are the disk brakes. Usually there are adjusting holes that, when uncovered, allow insertion of a screwdriver. In some jobs, a .010-in. feeler gauge is used to get the basic clearance between shoes and drums, but the final step is to expand the shoes against the drum and then back off enough to permit the wheel to turn freely. Brake adjustments often go haywire because they are not made at room temperature. For major adjustments, the drums must be removed.

Here, check for a loose backing plate. Make sure the anchor pins are free from corrosion. Check the brake-shoe return springs. They may not be of sufficient tension or they may not be hooked up to the correct shoes. Molded linings for the shoes are rather universally used, but there are notable exceptions in addition to the prewar cars. Buick, with the exception of the 1951 Roadmaster, has been using woven linings for the primary shoes and molded linings for the secondary. The same is true of Hudson. Willys and Studebaker switched to all-molded linings in 1941, Packard in 1938. Naturally, some mixups occur, which make for unsatisfactory braking and zigzag stops.

But when the lining is right and no satisfaction is obtained, we should be suspicious of some other things that are easily overlooked. One of these is concentricity. The shoes and their drums should have a common center so they are the same distance from each other at all points. Often, the end of a shoe, because it is unsupported, will have a tendency to take hold before the rest of the shoe. To check this, brake men chamfer the heel and toe for about a half an inch where a riveted lining is used. This is just a cutting down of the lining ends. Lining that is bonded to the shoes is left square at the ends so as to wipe the drum clean, but if grabbing develops here, the custom now is to cut the lining back to half way over the end rivet holes.

Lack of concentricity can be due either to the shoes being damaged (through mishandling) or a drum being warped. Drums can be rebored on a special drum lathe, but this naturally results in thinning them. It explains why the fellow with a set of trued drums may easily get into a new jam because he overtaxes the brakes, overheating and warping the drums again. Brake lining itself can be ground with a special wheel while on the car. Here again, difficulties dog the owner's track because too thin a lining will have a tendency to squeal. That is simply an outward sign of vibration.

Sometimes after a reboring, marks from the cutting tool will act like threads to draw the shoes away from the backing plate when the driver presses the brake pedal. Careful smoothing of the drum with sandpaper will stop this. Another condition to watch for is

[*Continued on page* 180]

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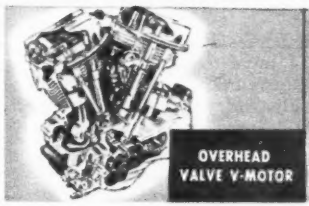
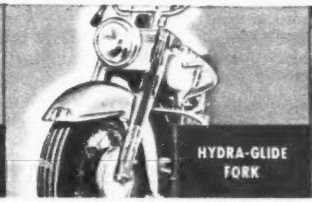


OVERHEAD VALVE V-MOTOR



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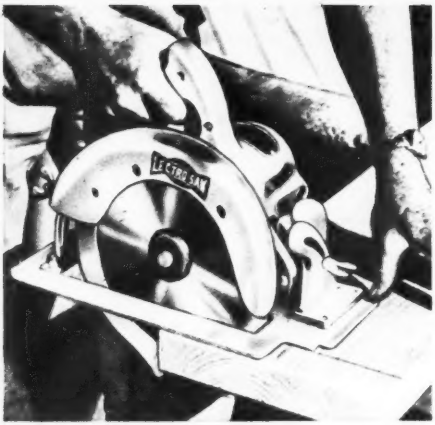


Lectro-Saws are

Professional Saws at Popular Prices

10 times faster than hand sawing!

BLACK & DECKER LECTRO-SAWS save you so much time, money and materials that they pay for themselves in a few jobs—and go on giving you extra-long years of usefulness because of the real quality Black & Decker builds into them . . . dependable motor, full-size ball bearings, high-quality helical gearing, hardened armature shaft, husky housings! Just look at their *professional* features listed below—check those *low prices*—then go try one at your hardware, electrical or building supply dealer!

ABUNDANT POWER! Motors built by Black & Decker specifically for tough power sawing.

EASY HANDLING! Handle-to-blade dimension held to minimum for easy control; handle close to center of gravity for good balance.

FAST ADJUSTMENT! Depth and bevel of cut easy to change; dual depth adjustments keep wrist position comfortable at any depth cut.

FULLY SAFEGUARDED! Telescoping blade guard. Instant release trigger switch. Correctly positioned saw-grip handle.

LOW PRICES! 8" Heavy-Duty, cuts to 2 13/16" depth, $92.50; 6" Deluxe Heavy-Duty, cuts to 2" depth, $76.50; 6" Heavy-Duty, cuts to 2" depth, $56.50.

BLACK & DECKER

ELECTRIC LECTRO-SAW SAWS

THE BLACK & DECKER MFG. CO.,
Dept. H11X, Towson 4, Md.

Help-Yourself Garage

[*Continued from page* 94]

day. She told me that it was the first time she had ever gotten mixed up with overhauling a car but she was thoroughly enjoying herself.

I'm used to odd customers by now, but there is one we still talk about. He was a young fellow, neatly dressed, who brought his car in one afternoon. After renting a stall and tray of tools he asked for a creeper—one of those gadgets a mechanic uses to roll around on under a car. However, when he started to work he flopped on the concrete floor and crawled under the car dragging the creeper beside him. He just wanted to use it to lay the nuts and bolts on so he wouldn't lose them!

One source of income I hadn't figured on is paying good dividends—several mechanics are using my address and phone number for their own. When they get a car to repair, they come in and rent space and equipment to do the job. It is a nice setup for them because they don't have any overhead except when they have work to do. And they don't have any capital invested either.

Distance doesn't seem to make much difference to the customers. One couple came from Oxnard which is about 40 miles from Los Angeles where my garage is located at the present time.

If you're starting a similar business I would recommend as many additional services as you can provide. People will drive in for one small item and, seeing that other services are available, become steady customers. You can offer steam cleaners, brake equipment and electrical testing equipment.

My original investment in this rental business was about $4,000. But, if you already have a garage and want to operate a rental business in one part of it, the investment would be less than $1,000.

Most new businesses do not break even the first year, but I have done far better than that. I got my original investment back in the first six months and, as my business is still increasing, I don't know what the final figure will be.

When I started this venture I wanted something in the garage business, yet not the usual run-of-the-mill garage. Well, I've got it and it's paying off.

And it is a pleasure to work with people who enjoy what they are doing. It's also nice to know that my customers save money every time they come in. At the same time, I'm making money. It's a combination that can't be beaten because the customers are satisfied and so am I. •

See how

YOUR GRAPHIC CAN GROW!

Amazing Range of Graflex Quality Accessories Gives Versatility PLUS . . . at budget cost!

GRAFLITE FLASH. It's the multiple circuit flash unit that fits almost every camera; doubles the opportunities for every photographer, because it lets you shoot in bad weather, indoors, at sports, and improves shadow control even in sunshine!

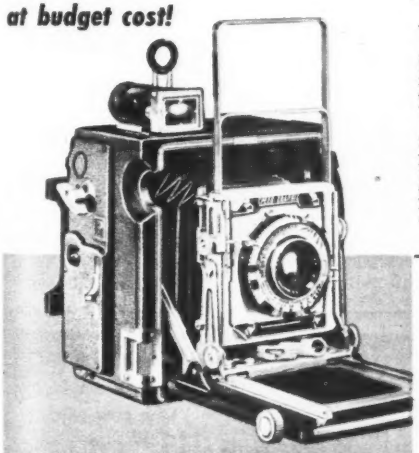
GRAFLOK BACK. Now standard equipment on all Graphics; can be fitted to earlier models. Provides a spring loaded Graphic Back for sheet film or film packs—a slide lock back for the Graflarger, roll film holders, Grafmatic holders.

120 ROLL HOLDER. Fits all Graflex and Graphic cameras up to 4 x 5. Lets you convert quickly to economical 120 roll film . . . B&W or color. Takes eight 2¼ x 3¼, or twelve 2¼ x 2¼ pictures. With autometering film control and exposure counter.

GRAFLARGER. With Aristo Cold Light. Attaches to any Graphic or Graflex camera to make a home, or portable enlarger; doubles as a retouching stand, a transparency viewer. Underwriters' Laboratories approved.

GRAFMATIC HOLDER. For all 2¼ x 3¼ and 4 x 5 Graphics, the Grafmatic will give new speed and freedom of action. No thicker than a film pack adapter, yet it holds six sheets of film . . . permits mixing of emulsions and rapid-fire sequences!

LENSES AND ACCESSORIES. Lenses of all kinds—portrait, wide-angle, telephoto—film holders of many types . . . leather and vulcanoid carrying cases . . . the famous Graphic Pan-Tilt Tripod Head . . . "Graphic Graflex Photography" by Morgan & Lester.



THE FAMOUS GRAPHICS
All-purpose cameras that can be used as *easily* as an ordinary folding-type . . . yet meet every challenge the expert can give them!

SPEED GRAPHIC
Focal plane shutter, speeds to 1/1000th.; built-in flash sync.; Graflok back with Ektalite Field Lens. 2¼ x 3¼; 3¼ x 4¼; 4 x 5.

CROWN GRAPHIC
Same as Speed Graphic, without focal plane shutter. Lower price.

CENTURY GRAPHIC
Lowest in price . . . but with many Graphic features including built-in flash sync.; Graflok back with Ektalite Field Lens; coated f/4.5 lens.

GRAFLEX

Prize-Winning Cameras

GRAFLEX INC., Dept. 108

Rochester 8, N. Y.

Please send me details on:—

- ☐ Speed Graphic
- ☐ Crown Graphic
- ☐ Century Graphic
- ☐ Graflite Flash
- ☐ Graflok Back
- ☐ 120 Roll Holder
- ☐ Graflarger
- ☐ Grafmatic
- ☐ Lenses and Accessories

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Mr. Fixerupper is again setting up business in the home basement, garage or tool shed. Repairing and restoring old, and building new, furniture and cabinets can be both a hobby and practical household economics.

Good wood shaping, fitting and finishing results can be obtained with a modest selection of files. Such a selection is also a thoughtful contribution toward the conservation of steel which is so important to the nation just now.

Buying *good* files—Nicholson or Black Diamond, for instance—also helps. Because they last long, they ultimately use up less steel than poorly made, short-lived files. Good hardware stores carry Nicholson brands—and will gladly help you pick out a non-wasteful assortment for your particular needs.

HOW TO USE AND TAKE CARE OF FILES – to make them last long – is worth knowing. "*File Filosophy*," Nicholson's famous 48-page book, tells you. FREE – *send for it today.*

NICHOLSON U.S.A.

NICHOLSON FILE COMPANY
49 Acorn Street, Providence 1, R. I.
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BLACK DIAMOND TRADE MARK

NICHOLSON FILES *FOR EVERY PURPOSE*

MI Tests The '51 Pontiac

[*Continued from page* 79]

and that makes the Pontiac with synchro-mesh a mighty flashy girl.

A complete acceleration test showed the Pontiac is not a pickup phony. It went from zero to 30 in 4.4 seconds, did one-tenth of a mile in 11.6 seconds and one-half of a mile in 32.2 seconds. These figures show that the job really has a wallop like a belt in the teeth from Jersey Joe. I didn't think the old boat could do it, but it really did get up and run when I pressed on the little pedal. In a green-light race a synchro-mesh Pontiac could pin back the fenders of many of the hottest cars on the market.

After the speed and acceleration checks, Bill Parker and I went for a tour through the proving grounds and drove the car up the G.M. 27 per-cent hill climb, stopping and starting several times en route. On a grade like this it's quite a trick for a car to stop cold and then start off again without the slightest sign of distress or clutch chatter. The Pontiac did it with ease.

I have checked the service records of the Pontiac for a number of years and have found that there isn't a more respected car on the market from a mechanic's standpoint. When I made a survey some time ago at service stations along the Penn Turnpike and the surrounding garages where breakdowns are hauled, I found out that many of the men, who see dozens of cars blow apart from hard running every day, owned Pontiacs and most of the others rated it tops in its price class. If you have driven over this super highway where, for nearly 200 miles, the 70-mile speed limit is only casually observed, you will realize what a tremendous tribute this is to the Pontiac durability. It is undoubtedly one of America's most outstanding car buys. It's as American as Sitting Bull and as a car for a medium-income family, it's hard to beat. •

ELECTRIFY your SEWING MACHINE

NEW LOW PRICE!
$11.50
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Buy direct from manufacturer and save! Kit comes fully wired, installed in a jiffy. Fits all machines! You get these all-new parts!

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10 DAY FREE TRIAL—ORDER NOW!
Send no money, pay COD or send money order and we'll pay postage. Please state whether wheel on your machine turns toward you or away from you. Shipping wt. 6 lbs.

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Exclusive for Ford Owners!

BUY AUTHORIZED RECONDITIONED

Ford Brake Shoes at a real saving! Warranted by Ford Authorized Reconditioners!

When it's time for new brakes on your faithful Ford, here's the way to do the job at a saving! With AUTHORIZED Reconditioned Ford Brake Shoes, you get efficient, long-lasting braking power! —*and you save a great deal of money!*

AUTHORIZED Reconditioned Ford Brake Shoes are superior in many ways to *overhauled* shoes:

1. **their quality is superior.** (AUTHORIZED Reconditioned Ford Shoes are completely stripped, cleaned and jig tested to print specifications) . . .
2. **they are lined with Genuine Ford Brake Linings** (on highways and test tracks, Ford linings are given 3,250 emergency stops before acceptance) . . .
3. **they carry the AUTHORIZED Reconditioner's warranty** assuring the same high quality as a *new* shoe (all brake shoe parts meet original factory specifications).

And here's another important fact—all shoes are rebuilt in the plants of Ford-authorized, Ford-inspected Reconditioners. *Only brand-new Genuine Ford Parts are used!* If you're not sure of your *present* brakes, let your neighborhood Ford Dealer give your car a brake shoe inspection. He can spot trouble *before* your brakes give out.

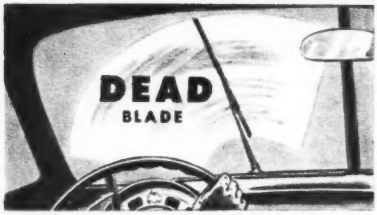
Save dollars, too, *with other* AUTHORIZED Reconditioned Ford Parts . . . Carburetors . . . Fuel Pumps . . . Distributors . . . Voltage Regulators . . . Generators . . . Starting Motors! All carry Reconditioner's warranty.

LOOK FOR THIS EMBLEM

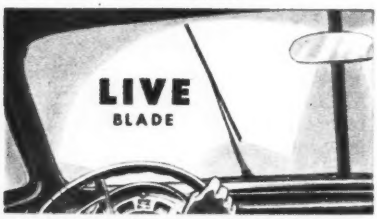
on the engine or reconditioned parts you buy. It's your assurance of the AUTHORIZED Reconditioner's warranty against defects in material and workmanship for 90 days or 4,000 miles (whichever occurs first).

THE BIGGEST RECONDITIONED "PART" OF ALL! An AUTHORIZED Reconditioned Ford Engine has over 150 new or completely reconditioned Genuine Ford Parts . . . gives you new-engine power for about half the cost of a new engine!

DEAD BLADES MAKE DEAD DRIVERS



THIS DEAD WIPER BLADE **still may look okay but it streaks glass dangerously. DEAD blades make DEAD drivers!**



THIS LIVE ANCO BLADE **wipes clean . . . clears rain . . . clears muck . . . lets you SEE. Protects you and your loved ones from smashups.**

Get Live New ANCO Blades . . .
Fit Your Car Quickly . . . At More than 260,000 Service Stations

Even the best wiper rubber goes dead . . . from exposure . . . often in six months or less. Don't be a Dead Blade Driver. Don't risk facing criminal negligence charges, after a needless storm-bred smashup, with dead blades found on your car.

Come Clean! Replace at once your Dead wiper blades with LIVE new ANCO Blades. They are best for most miles of quicker, cleaner wiping. Get yours today.

ANCO RAIN-MASTER **model for Flat windshields. Fits all cars. World's largest selling replacement blade.**

ANCO CLEAR-FLEX **model for Flat or Curved windshields. Fits all cars having Curved windshields . . . best for Flat windshields, too.**

THE ANDERSON COMPANY
Gary, Indiana, U.S.A.

The Fantailed Phantom

[*Continued from page* 90]

may decide to skim the top of the brush before getting altitude.

Rarely do you get a really open shot since grouse normally take refuge in heavy cover. When you do get an open shot, it usually comes as such a surprise that you miss. I had that experience just last fall. A grouse got up right under my feet. When I recovered from the shock and hurriedly lifted the gun the bird was streaking across a wide open space and I never touched a feather with either barrel. Later in the day I managed to get in two difficult shots successfully, but that one miss rankled me for two days.

Just to point up the unpredictable qualities of the bird, I can give you an illustration. A friend of mine, crossing an open knoll between two growths of spruce, had a bird cross this open area. He snapped two shots at the bird and for a couple of seconds it appeared that he had missed, then the bird began towering and flying in a series of circles. This calm and collected grouse shooter kept firing and reloading until he had blazed away nine times. The grouse finally fell dead as a result of the one pellet which had struck its head probably at the first shot.

Another friend who witnessed the exhibition could not have been happier at the circumstance:

"It might be a good idea if we take Don out to the farm and let him practice awhile on Plymouth Rocks and White Leghorns before we take him out grouse shooting again. The practice would do him a lot of good and certainly it wouldn't harm the chickens."

A novice at upland game shooting, provided he has learned how to shoot with reasonable accuracy, can turn in a reasonable score on birds such as pheasants, quail and woodcock, although the latter may cause him a few difficulties at first. Then, after he has shot at or heard about 100 grouse he will begin to learn the thing which any veteran grouse shooter could have told him at the beginning—that every shot at grouse is a different one. These birds simply refuse to get in a rut.

In many instances, I have found, the novice grouse shooter is inclined to shoot too quickly. When a bird flushes very wild there is little else you can do, but when one flushes within normal range, say 12 to 15 yards, make your shot a deliberate one. Don't snap the gun up and blaze away. Get it up fast, line up on your target, then touch it off calmly. One trick that sometimes works is to force yourself to count to three after the gun is up.

There have been numerous arguments as to the best gun for this shooting, but if you really

give the ranks of the veteran grouse shooters careful study you will find the overwhelming majority lean toward the conventional double gun or the over-under. And in most instances you will find these guns bored with one barrel improved cylinder and the other modified choke. Gauge is not too important, but there seem to be more 16-gauge shotguns among the grouse shooters than among any other group of upland game gunners. The matter of weight is important, of course, and when you are going through heavy cover the shotgun with the long barrel is just an added problem. The 26-inch barrel is long enough, provided your gun is properly balanced.

Open-field shooting is out, if you want to hunt this bird, for he is more at home in the thickets and one of the best areas in which to seek him during the early fall is in the orchard of the old, abandoned farm. Fallen apples, and even those withered, puckery bits of fruit still on the bough, make tasty eating for the grouse. Thorn-apple clumps, thickets of wild grapes and later in the year the beech groves, all attract the birds for they offer a volume of food without too much effort.

When you approach one of these tangles, do so with real caution, and be poised for the shot which may come at any instant and with no warning other than the heavy whirring of wings. Unless you have a good dog, don't try to find the bird on the ground for your chances of locating one are about one in a thousand. You must depend on flushing the bird, if you have no dog, and I can think of no sport that calls for more alertness. This makes you tense on your shot which is one reason why the hunter's kill seldom is much of a threat to the grouse population.

In New England one of the favorite tricks is to hunt the birds on old tote roads. In some areas there is a good reason for this for the cover is so dense that hunting the thickets is almost impossible. The birds seem to like these old roads, particularly early in the morning and late in the afternoon. During a dry spell you will find places where they have been dusting on these crude highways.

The ruffed grouse, like the rabbit, is very definitely influenced by cycles and a peak of abundance is certain to be followed by one of scarcity. Unfortunately, state game agencies are seldom able to put through regulations that can control the take during the peaks of scarcity due to the local nature of the cyclic periods.

Regardless of where you find him, the ruffed grouse is a challenging quarry, and once you have had one good day of grouse shooting you are lost. The rest of your upland time will be spent hunting out the winged phantom at every opportunity. •

You'll *Prize* This Saw Year After Year

Atlas POWER KING 8" SAW

TURNS OUT MORE WORK—FASTER, EASIER!

Zip through a board with this Power King and you'll know you've picked *the* saw for your shop! Everything about it — big *precision ground table, ball bearings, tilting blade, exclusive rip fence* — combines to add to your craftsmanship, save you time. It's big enough to help you build a home, remodel rooms, make large furniture — yet smooth and accurate enough for the finest hobby work. See it at your Power King dealer's today, or send postcard for complete catalog of all 8 Power King tools.

OUTSTANDING FEATURES

- Tilt/Arbor, Ball Bearing Construction!
- 11½" Table Surface Ahead of Blade on 1" cut!
- 2⅝" Depth of Cut!
- 16" x 20" Table. 34" x 20" with 2 Extensions!
- Finest Rip Fence of All!

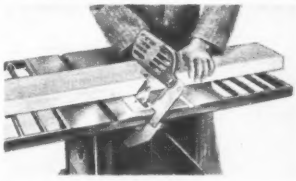
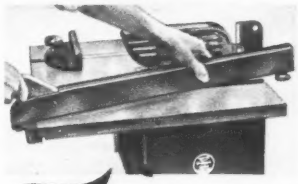


Table and work stay flat for angle cuts. Safer — more accurate!



Fence locks at both ends. Lifts off easily, positions instantly!

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$34.50

Makes dull, tiresome jobs fun. With this professional, motor-driven, orbital-motion SpeedSander, you can quickly and easily re-surface and refinish furniture, woodwork, walls or metal . . . can sand-off old paint, stain, enamel, rust or corrosion; smooth rough plaster; or buff, burnish or rub to a "piano finish." Operates with wet or dry abrasives. Three 4½"x6½" covers cut from 9"x11" sandpaper or abrasive sheet. Your local dealer will gladly demonstrate.

No. 150K SpeedWay SpeedSander Kit

Everything you need in fitted steel carrying case—18 each of 5 grades of sheet abrasive, 2 free abrasive felts, thick neoprene contour pad, steel surfacing plate, lambs wool polisher and cover template.

$49.50

Far advanced in design and construction these new SpeedDrills are lighter, handier, yet more powerful and faster-drilling than more costly old type drills. Drill steel, wood or concrete. Quality built for lifetime service, of die-cast aluminum with cast-in air cooling system and self-lubrication. Heavy cut-steel gears. Ball thrust bearings. Your SpeedWay Dealer will point out the many other superior features.

SpeedWay Kits Make Ideal Gifts

Any craftsman or "Mr. Fix-it" will be thrilled with a SpeedDrill Kit that drills, grinds, sands, buffs, polishes. No. 79 Kit provides a No. 79 ⅜" capacity (in steel) SpeedDrill, a SpeedStand, wire brush, sanding discs and backer plate, cloth and lambs wool polishers, paint stirrer and 5 steel drills—31 pieces in all in fitted steel carrying case, complete $32.50

No. 200 Kit. (Not illustrated) Similar to No. 79 Kit but with No. 200 ¼" capacity (in steel) SpeedDrill and 28 accessories in fitted case, complete $22.50

GA Kit. 20,000 r.p.m. SpeedWay No. 129 Hand Grinder with 16 mounted cutters, brushes, and wheels, complete in leatherette case. $14.50

Bench SpeedGrinders—$16.50 to $32.50—Ask your dealer to show them to you.

SpeedWay MANUFACTURING CO.
1866 SO. 52nd AVE., CICERO 50, ILL.

How To Build Caballero

[*Continued from page* 136]

Bow Block. Mahogany, 1 in. thick, shaped as shown and mortised to receive the ends of the monkey rails.

Monkey Rails. Mahogany, 1x1½ in. Neatly taper and round them and secure to deck edges with screws sufficiently long to reach into sheer battens.

Deck Cleats. Mahogany, ⅜x¾ in., fastened to deck edges as shown in way of the cabin.

Moldings. Mahogany, 1-in. half-round at the sheer and ¾-in. half-round at the cabin top and lower sheer. Paint them on their undersides before screwing in place.

Guard Rails. White oak, 1x1½ in. Bevel and round them and screw-fasten them into the lowest pair of topside battens.

Control Box. Plywood, ½ in. thick for the top and ¼ in. thick for the sides. Provide a suitable door in the bottom to allow access to a 6-volt hot-shot battery. Mount the steering wheel and controls as shown.

Windows. Make from Lucite as shown in the detail drawings. Fit the sliding windows with ⅝-in. stainless-steel felt-lined track and support them with cleats as detailed. Install strips of felt on the after ends of these windows to prevent the entry of water when the windows are closed.

Watercloset. Install in accordance with the manufacturer's specifications and fit a hinged top over it.

Wiring. Hook the various fixtures together with parallel 14-ga. primary wire. Mount suitable switches on the control box.

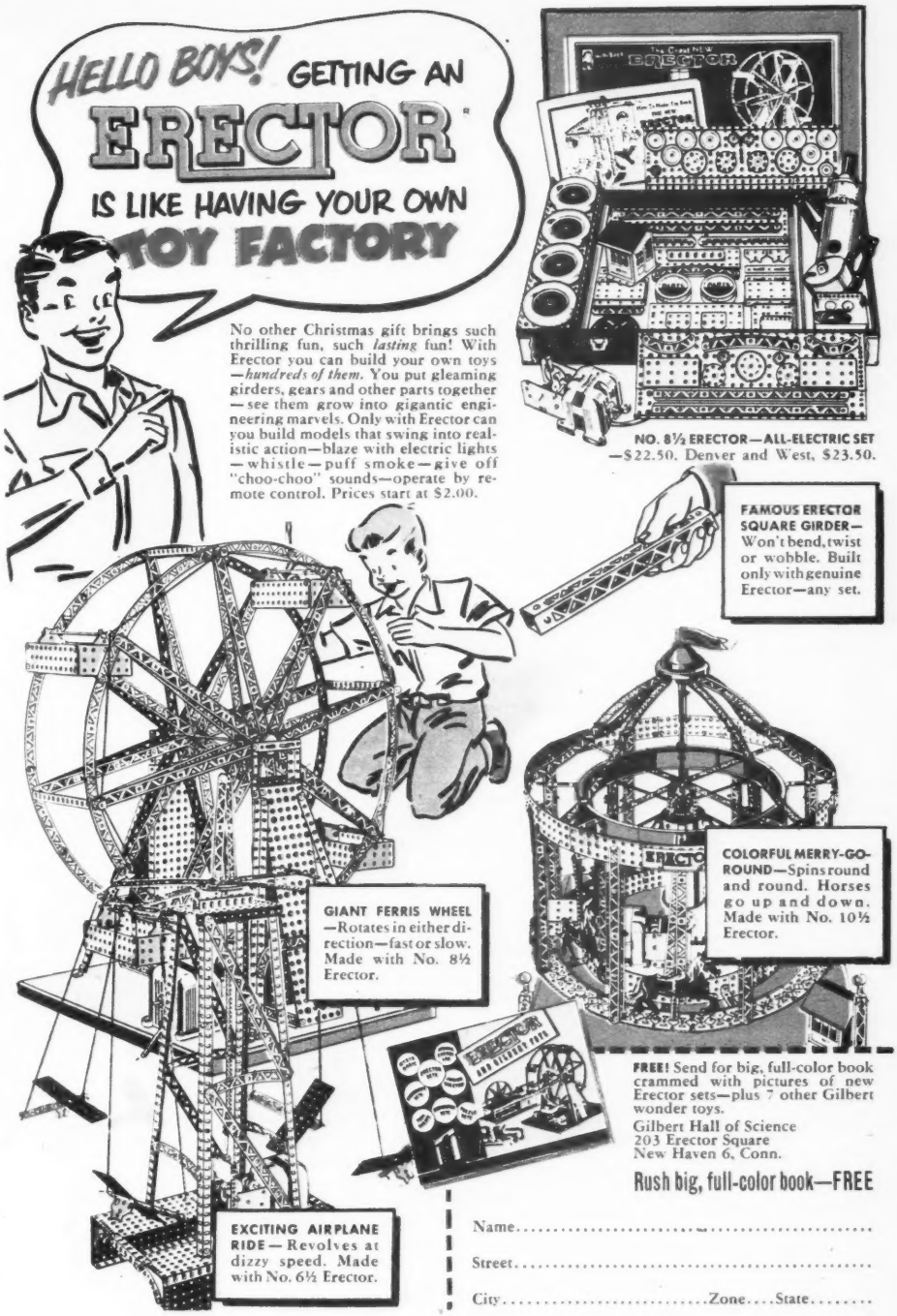
Berth Cushions. Make these from material to suit. There should be a separate removable cushion on the hinged top over the watercloset.

Deck Hardware. One 6-in. cleat, two 4-in. cleats, one pair of 5-in. bow chocks, one Class 1 combination bow light, and one stern light with fresnal globe.

Miscellaneous Hardware. One 15-in. steering wheel with four 2-in. sheaves, two 2-in. housed-fairlead sheaves, and 18 ft. of $\frac{3}{16}$-in. bronze-center steering cable; one set of throttle controls for either single or dual motors; one set of gear-shift controls for ditto; one 18-in. length of brass piano hinge; ten 2-in. brass hinges; three wardrobe hooks; one piece of ¼x1¼-in. brass flatbar, with suitable bolts, to make drag link for connecting dual motors; and one brass cabin lamp.

Miscellaneous Equipment. One 17-lb. Danforth anchor, 75 ft. of ½-in. manila for anchor line, 50 ft. of ¼-in. manila for warps, one fire extinguisher, one buoyant cushion for each passenger, one whistle, and one galley stove.

[*Continued on page* 180]


HELLO BOYS! GETTING AN
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IS LIKE HAVING YOUR OWN
TOY FACTORY
No other Christmas gift brings such thrilling fun, such *lasting* fun! With Erector you can build your own toys —*hundreds of them.* You put gleaming girders, gears and other parts together —see them grow into gigantic engineering marvels. Only with Erector can you build models that swing into realistic action—blaze with electric lights —whistle—puff smoke—give off "choo-choo" sounds—operate by remote control. Prices start at $2.00.
NO. 8½ ERECTOR—ALL-ELECTRIC SET —$22.50. Denver and West, $23.50.
FAMOUS ERECTOR SQUARE GIRDER—Won't bend, twist or wobble. Built only with genuine Erector—any set.
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FREE! Send for big, full-color book crammed with pictures of new Erector sets—plus 7 other Gilbert wonder toys.
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Rush big, full-color book—FREE
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AT LAST! A FASTER, BETTER WAY TO PREPARE HOLES FOR WOOD SCREWS!

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3-IN-1 DRILLS

In ONE Quick and Easy Operation

NEW DRILL INVENTION SAVES TIME! MAKES SCREW-JOINTS STRONGER!

Each Screw-Mate drill corresponds to the exact contour of a screw. That means you can countersink, drill shank clearance and *tapered* pilot hole — all at the same time! No longer must you perform 3 drilling operations, or attach special countersinks and counterbores to drills.

The *tapered* hole made by a Screw-Mate drill enables every thread on the screw to hold tightly — right down to the tip. (Ordinary drill makes straight pilot hole — allows only part of threads to come in contact with wood. Strength is sacrificed.) Screw-Mates are slightly smaller than corresponding screw diameter to provide a good snug fit. This increased holding power allows use of smaller screws. Drill shoulder stops drill at exactly right depth and size.

Screw-Mates are available in a wide variety of sizes for use with most screw sizes on wood, plastics, slates, synthetics, etc. Made of tough high-tungsten steel, they outlive ordinary drills. Screw-Mates fit any drill gun, drill press, or hand drill.

Buy Screw-Mates at your local hardware store today! If local dealer cannot supply you, order by mail, using coupon below. Include cash or money order. No C.O.D.'s. Please print dealer's name in margin.

MAIL COUPON TODAY!

(Circle all the drill sizes you desire)

SCREW-MATE SIZES NOW AVAILABLE!

$.75 each
#5 x 1/2"
#6 x 3/4"
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#8 x 3/4"
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#8 x 1 1/4"
#8 x 1 1/2"
#10 x 1"
#10 x 1 1/4"
#10 x 1 1/2"
#10 x 2"
#12 x 1 1/4"
#12 x 1 1/2"
#12 x 1 3/4"
#12 x 2"
#14 x 1 1/4"
#14 x 1 1/2"

$1.00 each
#12 x 2 1/2"
#14 x 2"

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America's Spooks

[*Continued from page* 98]

ghosts. When that bridge was being built, three men were killed in a fall. With them went their cat. Now all four come back every once in awhile and just sit there on that bridge where they died." The motorist shuddered and drove on in the gathering darkness.

One of the most fantastic ghost tales of all time centers around the tiny town of Lily Dale in up-state New York, the largest spiritualist center in the world. Hundreds of clairvoyants and mediums of all sorts oblige with seances there and perform many out-of-this world wonders with rappings, table-risings and unseen voices. There are often public seances in a vast assembly hall.

The story of Lily Dale and the spiritualists began more than a century ago when John Fox, a farmer, settled in the village of Hydeville near Rochester with his wife and his two young daughters, Margaret and Catherine. Not long after they moved in, the family began hearing strange noises—knocks and rappings on the walls, groans in the night, footsteps. They grew louder and louder, terrifying the parents but not fazing the children.

One night, Catherine called out as she lay in bed: "Mr. Splitfoot (a reference to the devil) do as I do!" She snapped her fingers three times. Three distinct raps were heard in answer. She snapped her fingers again and again, and each time the same number of raps responded. She called her mother, who was alarmed, and put the ghost to a test. The mother asked how old Margaret was—correct answer was 13 raps. She asked Catherine's age—nine raps. Then, "Are you a spirit? Rap twice for yes." Silence, then two loud, clear raps reverberated in the room!

The Foxes, now completely frightened and bewildered, learned something else: before they moved in, the house was occupied by a Mr. and Mrs. John Bell, who had once given lodging to an itinerant peddler. Neither the peddler nor the large tin box in which he carried his wares were ever seen again.

Neighborhood gossip claimed that the Bells had done away with him for his money and buried his body in the cellar. So, Fox and his friends began digging—and were astounded to find some strands of hair and parts of a human skull.

That did it. Everyone was convinced that the raps came from the spirit of the peddler and that the two little girls were mediums who could communicate with it. The children immediately became famous, traveling all over this country and abroad, earning huge sums in private and public demonstrations of their occult powers.

But four decades later the real shocker came. The sisters suddenly announced to a stunned world that they were blatant fakes—Margaret revealed that she had an uncanny ability to crack her toe joints, making them sound like pistol shots. That, they said, explained all the rappings.

But did it really explain everything? Listen to these two facts and judge for yourself:

Fact No. 1—Three years after her confession, Margaret died in a Brooklyn tenement. A woman doctor attended her during her final moments and reported that, while the sick woman could not move either her hands or her feet, at the very moment of her death a series of loud knocks and raps came from the walls, ceilings and floors. The doctor could not explain the noises, but she did state emphatically that they did not come from the cracking of Margaret's toe joints!

Fact No. 2—On Nov. 23, 1904, some children were playing in the cellar of a deserted house in Hydeville (the very house where the raps were first heard) when the wall caved in. Rescuers digging into the wreckage unearthed a headless skeleton and a large tin box exactly like the kind used by peddlers many years before!

Later, the house was moved lock, stock and barrel to Lily Dale, where it now stands as the shrine of the spiritualist movement and where anyone can inspect it and hear the ghostly rappings which still resound from the walls and floors.

If you ever get down to the town of Carrollton in the western part of Alabama, you'll come face to face with a ghost which looks at you from the garret window of an old brick building. This is the ghost of Henry Wells and it has been leering at visitors for 63 years—ever since he died while a mob intent on lynching him surged toward the doors of the old courthouse.

Wells was arrested in 1878 on charges of arson, burglary and attempted murder and clapped into Carrollton's flimsy jailhouse. Somehow, Henry had incurred the enmity of the townsfolk so mutterings of lynching grew loud. Alarmed, the sheriff spirited him from the rickety jail and put him in the garret of the sturdier courthouse for protection.

The mob soon learned where Wells had been taken and descended upon the building, shouting for his blood. Suddenly, a bolt of lightning tore open the sky and Henry's terrified face shone in the brightness as he looked down at the howling mob. The next morning the prisoner was found dead on the floor of the garret—and ever since then his face, stricken with mortal fear, has been seen in the window!

[*Continued on page* 172]

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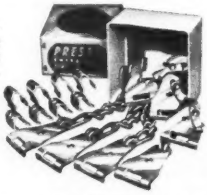

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America's Spooks

[*Continued from page* 171]

Many thousands of visitors have looked at the face. The Carrollton Civic Club has taken cognizance of the matter, terming the face in the window a case of photographic lightning. And if there were still scoffers around, this incident sent them scurrying:

On December 31, 1927, a furious hail storm struck the town of Carrollton, smashing windows over a wide area. Every single pane on the north side of the courthouse was smashed—every pane except the one through which the terrified face of Henry Wells peers!

A lovely young girl's tragedy was the basis for the haunted reputation of a large Virginia plantation. Evelyn Byrd, daughter of William Byrd, lived in a massive home called Westover early in the last century. According to the custom of the times, she was sent to England to be educated, but there she fell in love with a young nobleman. Her father would not hear of the match. Evelyn returned and pined for her lost love until she died.

Since that time, her gentle ghost has haunted the plantation. Visitors time and again report seeing a filmy, cloudy figure walking sadly down the lanes and sitting in the garden. She sighs ever so gently and floats away as they approach. She's a kind ghost, they say, a sweet and pensive one—the ghost of a girl who loved and lost.

And how about the most famous home in America—the White House? Did you know that many believers in psychic phenomena have been asking the question: "Was there a spook in the White House?"

Listen to this spine-chilling tale and judge for yourself:

A short time before his assassination, Abraham Lincoln had a series of prophetic dreams. History records that Lincoln confided his fears to his wife and members of his cabinet not long before John Wilks Booth leaped upon the stage of Ford's Theater one evening and fired the fatal shot. What were his dreams? Well, he forecast the tragedy which befell him almost exactly as it occurred!

Yes, America is building up quite a tradition of ghost stories, tales of unexplained events that confound science. You say you don't believe them? Well, is there a ramshackle pile of a building, its broken panes like sightless eyes in a skull, standing in some lonely spot near your town? Does the wind moan eerily through the trees and the moon cast a ghostly pallor over the scene? Visit it in the dead of night. Spend the witching hours inside . . . if you dare. But don't say we didn't warn you—America is a lot more haunted than you think. •

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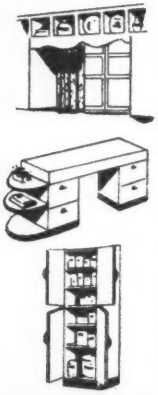

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Without A Trace

[*Continued from page* 61]

that last phone call Mix told his dad he had sold the car to Holland for $2,500 and was paid in two certified checks. His father advised him to get a bank draft for the checks and send the money to the Central Trust Co. in Rochester. Dean agreed, but the money never reached Rochester and the certified checks have never been cashed.

Holland told police he last saw Mix in Grand Central Terminal where the young man had gone to pick up his baggage. They parted at the station and he never saw him again. Since then leads have sent police scurrying from Times Square to Arizona, from Philadelphia to Sunset Boulevard in Hollywood, but Dean never turned up.

Murder? Suicide? Kidnapping? A serious accident or illness? Did he drop out of sight voluntarily? Your guess is as good as the most brilliant minds. They just don't know.

Then there is the almost supernatural disappearance of William F. Ferry, who placed a wreath on his wife's grave, then drove down the Bronx River Parkway as one of the worst snowstorms in the history of the east shrieked to a climax. Ferry vanished into the storm and, what is more astounding, so did his car! It never turned up in an accident, a parking lot or garage, was never found abandoned and was never re-registered.

Now, how about some of the really famous disappearance cases? Here's something you probably didn't know: despite the official verdicts of death, vast numbers of people still believe that the lost celebrities are still alive and will some day return to civilization.

For example, Don Haynes, Glenn Miller's personal manager until his disappearance in a British plane bound for Paris in 1944, only recently was forced to issue a statement ending once and for all the persistent rumors that the band leader was still living. There are stories that claim Miller is a basket case and doesn't want anyone to know, that he is in North Africa voluntarily, that he's a psychopathic patient in a veterans hospital. Says Haynes: "I want to put an end to these ridiculous rumors that Glenn Miller is still alive, anywhere, under any circumstances."

Similar rumors are constantly cropping up concerning flier Amelia Earhart, whose plane disappeared in the Pacific in 1937. The most frequent one insists that she is still alive on a tiny atoll, far from the Pacific sea lanes, awaiting a rescue ship.

Miss Earhart was last heard from while on a flight from Lae, New Guinea, to Howland Island, a speck of land two miles long and a half-mile wide. The theory was that she was

forced down. Could she have survived? Although her plane was a land ship without special flotation apparatus, it had good buoyancy for that type of craft, obtained from the wing tanks and general wing construction. Experts said, however, it could have remained afloat only a few days. Could she have drifted to a tiny isle, and is it possible that the mighty fleet of warships which hunted for her could have missed her?

Recently, Mrs. Amy Otis Earhart, Amelia's mother, broke a 14-year silence to announce her own theory. The flier, she said, died in Japan on a U. S. mission!

"I am sure," Mrs. Earhart declared, "that Amelia was on some sort of government mission, probably on verbal orders, because Amelia explained there were some things she could not tell me. I am equally sure she did not make a forced landing in the sea.

"She landed on a tiny atoll, one of many in that general area of the Pacific, and was picked up by a Japanese fishing boat which took her to the Marshall Islands, then under Japanese control. Then she was taken to Japan where she met with an accident—an arranged accident that ended her life."

What happened to famous travel author Richard Halliburton? Here's what we know: on March 23, 1939, his vessel, the 75-foot Chinese junk Sea Dragon, was plowing through mountainous seas 1,200 miles west of Midway Island. Capt. John Welch, the skipper, radioed the liner President Coolidge in the vicinity: "Southerly gales, squalls. Lee rail under water. Hard tack. Bully beef. Wet bunks. Having wonderful time. Wish you were here instead of me."

That wryly humorous message was the last the world ever heard from the little craft. Naval ships scoured 152,000 square miles of ocean for weeks, but no trace of the Sea Dragon was ever found.

A few years ago, bits of wreckage washed ashore at Pacific Beach, Calif., many thousands of miles from the scene of that storm. Big timbers and unusually large brass bolts helped identify the wreckage as Chinese. But tantalizingly, not enough floated in to establish that they came from the Sea Dragon.

That slim bit of evidence is all the proof we have that Richard Halliburton died during a storm at sea. Do you accept it?

How about Judge Crater? Ever since he disappeared on the night of August 6, 1930, police of every state have hunted for him in vain, fruitlessly following leads which indicate he is a monk in a monastery, is living in a California shantytown, is a waiter in a desert oasis, a mental patient in a dozen hospitals.

Did Crater vanish voluntarily? Here are

[*Continued on page* 176]

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NORTH BROS. MFG. CO., Philadelphia 33, Pa.

Without A Trace

[*Continued from page* 175]

the arguments against such a theory: (1) he had asked his maid to return August 25 to clean his apartment when he returned from a brief vacation; (2) he had just ordered two suits to be ready when court reconvened; (3) he had been appointed to fill an unexpired bench term, had made an excellent record and his chances for nomination and election to a full term at $22,500 a year were good; (4) he was not accused of any crime.

But these are the arguments in favor of voluntary disappearance: (1) on the day he vanished he had drawn $5,150 from the bank and had the cash with him; (2) he had been active in Tammany Hall politics just at the time that a big job-buying scandal involving a close friend was erupting.

Crater's case is certainly an enigma, but an even more world-stunning vanishing act was accomplished in modern times by one Adolph Hitler. Actually, this is all we know about the Fuehrer's death:

It was April of 1945 and, like a hunted beast, Hitler retreated into Berlin's ornate Reichschancellery, ordering the doors and windows barricaded as Russian shells and Allied bombs hit closer and closer to their targets. Soon Hitler with Eva Braun and the members of the German Supreme Command retreated into his private bunker on the grounds. It was a squat, gray block of massive concrete with a heavy steel door facing the gardens and a number of deep, dark rooms far underground. From there he gave his last orders to his shattered army.

Finally, on May 1 came announcements the world had waited years to hear—Hitler had killed himself and the war was over. Confidently, Russian troops plowed through the ruins of the Reichschancellery, but Hitler's body was nowhere to be found. Said Dr. Hans Fritsche, assistant to Goebbels: "His body has been hidden in a place which will be impossible to find."

But many believe that Hitler never died. Did he, as many fear, flee in a U-boat to South America, or by motor car to Spain? Is he hiding somewhere in the mountain fastnesses of Germany, in the Black Forest, in the Alps of Bavaria, hatching his mad plans and waiting for the time when he again can head a militant Germany?

Nobody knows because Adolph Hitler vanished like all the others, like Cinderella's beautiful gown when the clock struck twelve.

These missing people may be dead—or they may some day return. Meanwhile, they are nothing but big question marks in the open file marked Vanished Without A Trace. •

$50,000 For A Penny

[*Continued from page* 67]

couldn't possibly enter every home and pore through every bundle of letters tied up with faded ribbons. You'd think that of all places, banks and post offices would long since have been throughly fine-combed, yet 42 valuable stamps were discovered in the basement of a Philadelphia banking house among an accumulation of old papers 65 years after they were issued.

"Recently, an old lady living in the fashionable Mayfair section of London accidentally uncovered several sheets of stamps bought by her late husband many years before. The original outlay was $700. The old lady sold the collection for $30,000."

There are other incidents like these—like the story of the Baltimore philatelist who got permission to rummage through the attic of a courthouse in Upper Marlboro, Md. By lantern light, he found 200 yellowed letters on a string, one of which bore half of an old ten-cent stamp. He threw it away in disgust at the mutilation, but then his eye caught a familiar Baltimore post mark covering the edge where he thought the stamp had been torn. He realized at once that he had unearthed a treasure. It seems that in 1847 the stock of five-cent stamps had been running low, hence half of a ten-center was made to do duty as a nickel one. The one he found was known as a horizontal split ten-cent 1847, and worth a tidy sum.

Question: I've got a drawerful of old stamps, a trunkful of old letters from grandpa's day, an albumful of odds and ends I had long since forgotten was around. How can I tell which are the big money finds?

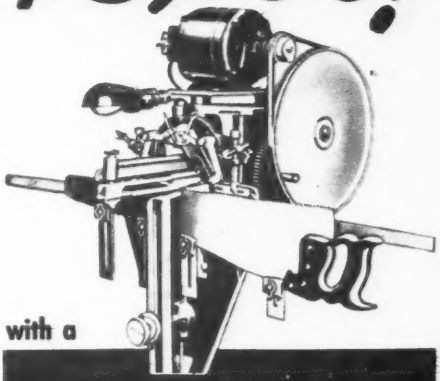
Answer from the experts: Here is a list of some of the most sought-after stamps in the world, just a few of those which command top money in the philately market. Prices listed are the catalogue values.

"Post Office" Mauritius. In 1847, a one-penny orange and a two-penny blue stamp were issued on the island of Mauritius. They were engraved by a half-blind jeweler who got ten pounds for his work, ten shillings per thousand for printing them. There are only 26 known copies of both, the one-penny is listed at between $15,000 and $20,000 and the two-penny at $15,000 and $17,000, depending on condition.

Postmaster provisional. These were issued prior to 1847 in Baltimore, St. Louis, Alexandria, Annapolis, Boscawen, Brattleboro, Millbury, New Haven, New York, Providence. Some are worth fabulous sums. One

[*Continued on page* 178]

Last Year's Profit $3,000!



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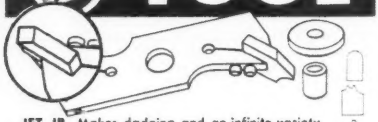

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$50,000 For A Penny

[*Continued from page* 177]

from Alexandria is catalogued at $15,000, while others range up to $10,000.

Two-cent British Guiana pale rose imperf (meaning no perforations) dated 1850. It will get you $17,500.

1851-52 two-cent Hawaiian blue stamp. That's a $15,000 hunk of paper.

1869 15-cent brown and blue, showing Columbus landing in America. Look carefully, now. If the picture is right side up, it will fetch only $27.50. But if the picture is inverted—a printing error—the value zooms to $10,000.

1869 30-cent blue and carmine with the flags inverted. That's $8,000.

1869 24-cent green and violet with the picture inverted. It's worth $6,000.

1927 Newfoundland air mail De Pinado, with a picture of King Henry VII. It's worth $3,750.

First air mail stamp, issued in 1918, with the airplane, printed in blue against a rose carmine border, upside down. That's $4,000.

1856 British Guiana. If it's a four-cent magenta, it's worth $600. If it's a four-cent blue, it's worth $4,000. If it's four-cent blue, with the paper colored through, the value rises to $6,500. And, brother if it's that one-cent magenta, you can name your own price. So far, only one copy is known to exist and it's the world's most valuable stamp, priced at $50,000!

Remember, too, that condition is a vital factor in the value of stamps. Extra fine copies command the best prices while unused stamps without gum or with gum partially used usually sell for less than copies with the full original gum. Stamps which are slightly defective, such as those off-center, heavily canceled, faded or stained, dip sharply in price. Damaged stamps, those torn or mutilated or having thin spots, aren't wanted by the big collectors and usually only bring a small fraction of the price of a fine specimen.

Can you make money by investing in stamps—buying up new issues at the post office, stashing them away and letting them grow in value?

Well, the experts say there *is* big money in stamps if you treasure hunt for the valu-

able ones, but stamps as an investment are highly risky.

Sylvester Colby, president of one of the country's foremost stamp firms, sums up the opinion of most of the professional philatelists in this phase:

"It can be done, but only by extremely shrewd, extremely wealthy and extremely lucky persons.

"It is true that sometimes investments in stamps, especially commemoratives, can reap fantastic profits. For example, in 1898, when the Trans-Mississippi issue came out, one man spent $1,000 for half-sheets in all denominations. He put them away and began selling them a few blocks at a time in later years. Within fifty years he had made a grand total of $99,000 profit from his original investment and had financed two sons through Harvard.

"However, these are exceptions. Your best bet is to save stamps for fun and look hard for the sleepers. When it comes to investing, people who know feel you're a lot better off buying U. S. defense bonds."

A word of warning: Whenever something gets to be as really big as stamp collecting, the gyps and the frauds and the counterfeiters are attracted by the hundreds. Stamps have their share of phonies who for many years have been faking cancellations, overprints, watermarks, grilles, perforations and printing errors.

How can you make sure that the stamp you think is a rare find is not actually a forgery? Have it certified. The Philatelic Foundation, 22 East 35 St., N. Y. C., will give your stamp a thorough going-over and, if it's genuine, will issue a certificate attesting to the fact. A small fee is charged for this service. The Friedl Expert Committee, 522 Fifth Ave., N. Y. C., also issues certificates. It, however, specializes in foreign stamps.

Here are four good rules on how to avoid the forgeries, listed by Winthrop S. Boggs, director of the Philatelic Foundation:

1. Buy only from a reliable dealer.
2. Avoid bargains. If it's a valuable stamp, there is no reason for anyone to sell it cheaply since there is always a market for it.
3. Don't try to test the stamp yourself. You can easily ruin it. Leave that for the experts.
4. Don't buy a truly expensive stamp unless it is accompanied by a certificate.

It's easy to see why millions of Americans collect stamps. You can have an absorbing hobby as well as a chance to grab off those gilt-edge sleepers which play hide-and-seek with collectors.

Look for the silver lining? Well, you'd do much better to look for the one-cent magenta. •

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Car Care

[*Continued from page* 160]

sluggishness of the brakes in cold weather. This is a tip-off that there's inferior fluid in the lines. It has partially evaporated during the summer, leaving a heavy residue that thickens further in the cold. A good flushing and refilling is the proper caper here.

Any foreign matter in the brakes will defeat your best efforts to obtain a straight-line stop. Grease is the worse actor here. Trouble may come from use of the wrong kind of wheel-bearing grease or from not cleaning out the old front-wheel bearing grease twice a year. Special fiber grease should be used here, and careful inspection of the retainers should be made. On rear wheels, lubricant can enter the drums past defective retainers or even past good retainers if there is overfilling of the rear end or excessive pressure from action of the gears. On cars with torque-tube drive, if the transmission leaks at the rear, lube will run down around the enclosed propeller shaft to overfill the rear end.

Loose hub bolts are common causes of faulty braking, but are seldom considered. So is brake-fluid leakage. Most owners figure that if no fluid drips on a tire, there is no leakage. If you snap back the rubber boots over the brake cylinder of the suspected wheel, things will have a different appearance. Leakage here may result in fluid dripping directly on the shoes. •

How To Build Caballero

[*Continued from page* 168]

Paint. Apply two coats of paint to the interior, three coats of paint to the topsides after priming, three coats of hard antifouling bottom paint, and three coats of spar varnish to all bright work after filling and staining. Strike in a boottopping of contrasting color with its lower edge 1¼ in. above the water line at the stern and 2½ in. above the water line at the bow.

Dual-Motor Installation. Locate the motors on the transom with their thrust lines parallel to the center line of the boat. Connect them with a drag link fastened to the back edges of the motor rests on their center lines. Fasten arms to the motors to take the ends of the steering cable. Since the motors must turn as a unit, a little experimentation with the installation may be necessary. The steering cables must hold a constant tension throughout the turning radius. Once the installation has been correctly made, the transom should be fitted with four recessed clamp sockets so each motor can thereafter be returned to its proper position. •

The MI Sportster

[*Continued from page* 115]

from stock metal. Shop around a junk yard and obtain a section of an old car top. When applying this lid start at rear of cockpit and drill and bolt every 3 or 4 in. At points on the body where the skin overlaps, lead or putty can be used for smoothing. To cover hood frame, lay the sheet metal on a flat surface and place the frame on top and hammer the skin around the pipe.

The deck rear corners are made of strips of metal 1 in. to 1½ in. wide. Curve them to general shape, overlapping each other, and place in position under skin. Solder them together and also to the body skin. Then build up with lead and sand to shape.

The cowl firewall is made of No. 20 gauge steel. Cut to make a close fit with front top edge of the cowl. Solder at point of contact between cowl skin and top of firewall. Bolt firewall to cowl posts and to cross bracing. Cut out a section of the firewall to permit full clutch and brake pedal travel.

As far as color goes, the owners individual preference will of course rule. This month's cover will give you a pretty good idea of what the original looks like. The body is a rather light yellow with red upholstery for added snap. And speaking of snap, MI Editors Bill Parker and Bob Brightman each gave the car an extended road test and both will vouchsafe for the car's pickup and cornering ability. They are both superb. In fact, the car will actually spin its wheels on dry concrete if the clutch is let in too quickly. Take it easy! Give the folks a chance to see the car, not a blur. •

Approximate Cost Data

Ford 1932 two-door sedan	$ 45.00
Shock absorbers	50.00
Electrical conduit tubing	12.00
Dropped front axle	20.00
Sheet steel	15.00
Misc. ⅛ in. and ½ in. tubing	2.00
Aluminum for hood	4.00
Plexiglas windshield	4.25
Plastic for upholstery	10.00
Misc. material, tail lights, sealed beams, etc.	10.00
Paint and body putty	10.00
Welding gases and rod	10.00
Edelbrock 8.5-1 heads	75.00
Dual manifold	45.00
Aluminum flywheel	50.00
Clutch assembly	7.00
Distributor	10.00
Carburetors	12.00
Reconditioned engine	75.00
	$466.25

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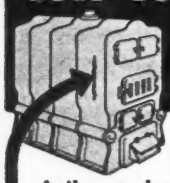

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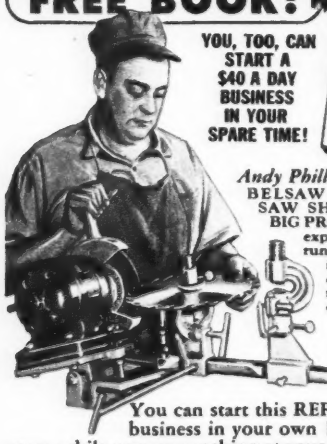

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Model Roundhouse

[*Continued from page* 123]

necessary for the straight-of-ways and supports.

There are two types of structures which are used today. The first is a large flat piece of plywood or other supporting material on which the track is mounted. This is known as solid platform construction. It has limitations in that there is very little chance for a difference in grade and it is difficult to get to the center of the layout for adjustments.

The second and the most popular today is the open type bench as illustrated in this article. It is easy to see that grades can be made as desired and that each track is an individual unit. It is the only possible way to bring realism into the layout. You will usually find that the roadbed itself maintains a fairly constant level with minor grades, but the surrounding scenery rises and falls according to the typography of the land. The layout should be built strong enough so that you can actually walk over it. Screw the uprights and various pieces together instead of nailing them.

This particular layout has 85 ft. of track. The corner legs are 3x3 in. posts to which 2x4 in. have been bolted. The layout is a double oval with a figure 8 for reversing operations. It is always best, of course, to have a radius as large as possible and only under rare circumstances should a minimum radius be used.

The first thing to do is to select good straight grain boards. This particular layout happens to be HO gauge with a minimum radius of 24 in. The boards are then cut out on a band saw or a jig saw, and screwed together with small ¼ in. plywood plates. With the curved section in approximate position, the uprights then can be located and screwed in place.

When building your layout, take into consideration the other things you're going to add, such as a yard, railroad stations and villages. If at all possible, avoid grades on curves and try to keep all grades below two per cent. A one per cent grade is equivalent to 12 in. of rise in 100 ft. of level distance; a two per cent grade is a 12 in. rise in 50 ft. •

ATOM-BOMB SHELTER

Combine practicality and security by engaging in this two-in-one project which includes a double garage and a sturdy concrete shelter built into one corner. Shelter may be used for storage or as tool room. For your copy of the complete plans which include diagrams and full instructions, remit $1.00 to *Mechanix Illustrated* Plans Service, Fawcett Building, Greenwich, Conn. Plan No. HJ-18.

Rustic Shutters

[*Continued from page* 124]

Cut a V-wedge down the center of your board about ¼-in. deep on your tilting arbor circular saw or by hand with a chisel or saw. Plane down your outside long edges to correspond. Take another board if you want a wider model, saw and bevel it the same way. The width of your finished shutter should be about half the width of your window sash.

The shutter shown in the lead photograph is two planks wide but appears to be four V-rustic panels. Put planks side by side and chalk in the outline of a tree—in this case a pine. The tree should be centered in the upper half; space it so it will not touch or run under your hinge.

Saw out your tree on a jig or coping saw; make this easier for yourself by holding your board in a bench vise and sawing from the edge before assembly.

With a rasp smooth down your cuts and chew away unevenly spaced gouges on outside edges.

Saw out your hinges from ½ to 1-in. stock. Make them to connect all panels. Nail in place. Then fashion the imitation rivet heads.

Make the latch and catch. Nail to the outside shutter edges. The latch is ¼-in. lumber, the catch 1-in. scrap, both stud-decorated. Wire brush your assembled job, then sand. You are now ready for the "art work."

Brush on some old cream or buff paint for an undercoat. After drying, putty all nail holes and undesirable cracks. For a second coat use chocolate brown. After brushing on, take a rag and make imitation grain strokes from top to bottom, with an occasional swirl for a knothole. For a lighter shade in spots, merely re-wipe.

If you desire still lighter hinges, put on touches of your cream or buff paint between studs, then blend into the brown with your dry brush. Leave full strength dark brown in the grooves, gouges and around the studs.

When nailing your shutters in place, position them so that about an inch of window frames shows on the outside of the hinge supports.—*Lyndon Ripley* •

Using a battery-powered outboard motor, this handsome model really performs beautifully. Construction is mostly of balsa, with plywood added where extra strength is required. For your copy of these complete, full size plans, remit 50 cents to MECHANIX ILLUSTRATED Plans Service, Fawcett Bldg., Greenwich, Conn. Please specify Plan No. 420

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Eighteen-Pounder

[*Continued from page* 143]

and draw lines between the points just described, which will determine the inside edges of the mortises for the sides to set into. Placing the inner edges of the sides on these lines, mark the outer edge of the mortises in the axletrees along the outer edge of the side pieces. Cut mortises only $\frac{1}{16}$ in. deep. The axletrees are now put in the lathe and the $\frac{5}{16}$-in. diameter arms turned on them. At the same time, turn shoulders in the ends of the arms for the brass bands, so that they can be driven on flush. The linchpins are made from No. 16x½-in. escutcheon pins with one side of the head filed flat, and cut to a length of ⅜ in. The stool, or quoin bed, and bed block are separate from the carriage and can be lifted out.

The transom is cut from $\frac{5}{16}$-in. stock with the grain running horizontally, and it is best fitted after the sides are fastened to the axletrees. It rests on the fore axle and the center of its upper edge is exactly below the center of the trunnions. On a real gun carriage, the transom is mortised into the sides, but this is not necessary here. Glue it in place and put a No. 14x⅝-in. escutcheon pin in from each side to represent the transom bolt. The breast board is cut from $\frac{3}{16}$-in. stock and may also be glued in place.

Clamps can best be made from a piece of ¼-in. brass. Bore a hole $\frac{5}{16}$ in. in diameter and scribe a line through its center. Mark out the shape of the clamps, saw them out, then saw apart along the center line. It is not necessary that the inside cut be an exact half circle.

The trucks can be turned from a piece of hardwood if they are to be painted black, but if left natural they should be laminated. Two $\frac{5}{32}$-in. pieces with the grains at right angles to each other are glued up and a $\frac{5}{16}$-in. hole is drilled in the center. Drill holes clear through and put bolts in from both sides to resemble through bolts headed over, and set the heads in almost flush. If you paint the trucks, put bolts in after painting.

After assembling, but before putting the trucks on, drill holes for the bed bolts to fit No. 14x⅝-in. brass escutcheon pins. Cut the tubing to fit inside the carriage, and drive the pins through the sides and into the tube.

If you have only wood-turning equipment, make the barrel from hardwood at least 1¼-in. square and a foot long. After finishing with fine sandpaper, use several coats of flat or semi-gloss black lacquer. The same applies to the metal fittings; if brass is unavailable, use any other metal and paint black to resemble iron. •

Metal-Cutting Band Saw

[*Continued from page* 144]

to fit the tubing and file flats on the latter to take the pulley setscrews.

Mount the jack shaft on a metal plate, using ½-in. nuts as shown. Two slots allow the plate to be regulated for correct belt tension with the different pulley combinations. By using a 2-in. pulley on the motor shaft and a 12-in. pulley on the jack shaft, you obtain a six-to-one reduction. A 3-in. pulley on the motor will give a four-to-one reduction. A 2-in. pulley is used on the jack shaft for the belt to the saw wheel.

The next reduction depends on the saw-wheel diameter. The second part of the chart gives the pulley diameters required for different band saws. The pulleys on the saw are designated as A or B and match those shown in pulley-arrangement diagrams. •

Blade Speeds for Different Materials

Blade Speed	Material
1,800 feet per minute	Aluminum (to ¼ in. thick) Asbestos Bakelite Builder's board Carbon Fiber Lead and Babbit metal Neoprene Plastics Rubber (hard or soft) Wood Zinc
980 feet per minute	Aluminum (¼ in. thick or more) Brass Copper Mica Transite (to ¼ in. thick)
275 feet per minute	Kirksite Phosphor bronze Silver Transite (¼ in. thick or more)
165 feet per minute	Iron, gray, cast Monel Porcelain Slate Steel, carbon (annealed) Steel, cast Steel, mild Steel, tool (annealed)

Saw-Wheel Diameter	Pulley Diameter	
	A	B
9 in.	6½ in.	8 in.
10 in.	7½ in.	9 in.
12 in.	9 in.	10 in.
14 in.	10 in.	12 in.

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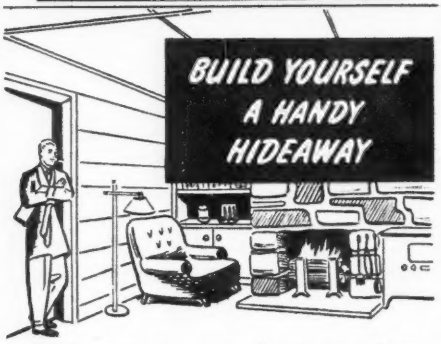

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Ends front wheel drag on 4-wheel drive Willys Station Wagons, Pick-ups and Jeeps

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Big, Money-Saving Offer Repeated by Popular Demand

MEYERCORD'S AMAZING, LIFELIKE
PLASTIC VENEER

it's easy to DECORATE
Re-creations of rare wood grains and fine marble

- furniture
- cabinets
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- book ends
- walls, doors
- table tops
- re-finish old pieces

SAVE NOW! SEND FOR INTRODUCTORY PACKAGE!

Now—Meyercord, originators of Plastic Veneer, again offers you re-creations of rare wood grains and fine marbles at a *big saving!* Used on furniture and TV cabinets for years, yet easy to apply at home—on wood, metal, glass or composition. Praised by thousands of home craftsmen for amazingly beautiful results! Plastic Veneer can be used on any flat or simple curved surface—can be top-coated, rubbed or waxed. Start your first project today! Order a supply now!

INTRODUCTORY OFFER!
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1 can of cement
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ALL FOR ONE PRICE **$5.00** POST PAID

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Enclosed find ☐ check, ☐ M.O. for $5.00, Plus $ _____ for _____ additional sheets, @ $1.50 for wood grains, $1.00 for marble, pearl and gingham. Each sheet contains 6 sq. ft.

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☐ Blond Harewood	☐ Guineawood
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☐ Fiddleback Mahogany	☐ Blue-White Gingham
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☐ Mahogany Stump	☐ Brecho Rose Marble
☐ Walnut Crotch	☐ Jaune Bonou Marble
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LOCKS onto the work "HOLDS ON," after you let go."

Finest locking plier because...

Clamps on better with *patented swivel* jaw which adapts itself to shape being held. Faster working because of *patented* jaw size indicator; you pre-set jaw size to approximate size of object. Easier opening with *patented lock release*; finger-operated lever readily releases 2000 pound bite.

$1.95
7" size
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Both bright nickel finish

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DOES THE RULE YOU OWN FIT YOUR NEED?

Experienced workmen know that the right tools to do a job are as important as the materials that go into it. Every rule in the MASTER line has been scientifically designed to do a specific number of jobs better, more accurately. The STREAMLINE is a natural for the hobbiest, the draftsman . . . TOP-OF-CASE one glance reading makes inside measurements a cinch . . . Figures and graduations on reverse (as well as front) side of the tape make it an efficient bench tool as well. See the superior MASTER STREAMLINE at your favorite hardware store today. Comes in #406, 6 ft., $2.50 each; #408, 8 ft., $2.75 each; #410, 10 ft., $3.00.

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BUILD and **DRIVE** your own **high speed racing boat** as hundreds of others are doing! Easy to follow our **simplified plans** for newest types of racing craft. Large selection of full race **Hydroplanes** ranging from 6 ft. to 20 ft. lengths. **Service, Racing, Utilities,** and **3 Points.** Both inboard and outboards.

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Four inches more than other heavy-duty lathes. 33" between centers. Extra features. Compare SHOPSMITH! It's a saw, sander, vertical and horizontal drill, too. Write for free catalog.

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Do expert saw filing without experience. Keep your hand saws extra sharp, true-cutting. Easy to use. Money back guarantee. Cash with order, prepaid. (COD postage extra.)

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These rugged walking or riding tractors are ideal for farm, truck garden. FREE illustrated catalog giving complete details, price lists—write today.

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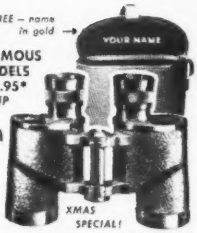

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NEW 8 power, 30mm Shur-Grip design Featherlight, COATED. $39.50* $135 Value!

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Over 50 modern plans and full size patterns. Racing classes, cruisers, inboard, outboard and sail boats. By famous designers. 6 to 30 ft. DESIGN CATALOG 35c. Design Catalog and woodworking manual $1.00.

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This exciting new book shows how to amaze your friends with chemical magic, describes many fascinating home experiments, tells of fun, thrills and big future opportunities for boys who know chemistry. Special atomic energy feature. Send today!

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ONLY Football Game that Shows Ball in Motion!

See runner zig-zag down field, escaping tacklers till finally "brought down"; connect for long pass or "hit 'em for loss"; GAIN or LOSS SHOWN RIGHT ON PLAYING FIELD! Amazing PLAY-VIEWER illustrates every play, as it happens, IN ACTION! Foto-Electric Football is Real Football—every play of football; real rules & scoring. HOW TO PLAY: offense calls play, opponent sets defense. Then Foto-Electric Play Viewer shows complete play in action! Interceptions, fake passes, fumbles, bucks, etc.

YOU See Play! YOU Control Play!

Based on scientific football records; over 1000 play combinations & line formations. Easy to play—nothing complicated—but lots of action! Consists of BIG Foto-Electric Play-Viewer & Playing Field, size 19-in. long, 12-in. wide, nearly 4-in. deep. Has electric cord which plugs into any 110 volt AC-or-DC outlet, which operates Foto-Viewer. Plus 6x12-in. scoreboard, erected on one end of field, where time clock and score are kept with movable dials. In box with rules, play selector, etc. READY TO PLUG IN & RUN! Real thrills—any time of year. Ideal for 2, but 1 or more can play. Used by coaches & players, all ages. America's largest selling & best football game. Order from us now—money back guarantee protects you! (Add 35c post.) COMPLETE ONLY $6.98

FOTO-ELECTRIC BASEBALL Same as above in size & design only baseball—you see real play in action. Real-game thrills & strategy. (Special, Both Games $13.96 postpaid). (Add 35c post.) ONLY..... $6.98

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Handy Hank says: "Try these slick tricks with PLASTIC WOOD"

Fill cracks in chairs—

Makes loose joints firm, sands to a smooth finish!

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Replaces rotted wood, tightens loose screws . . . *easy* to apply!

Repairs broken toys—

Mend cracks, nicks! Smooth finish!

Also useful in filling cracks in floors, nail and screw holes, repairing loose tiles. *Handles like putty . . . hardens into wood!*

PLASTIC WOOD®

A CELLULOSE FIBRE FILLER

IN CANS OR TUBES

DOZENS OF OTHER USES

Build It, Fix It with

AMBROID

"It stays stuck!"

Dries entirely by evaporation of the solvent. Quick setting—no distortion. Ideal for assembling, repairing, home crafts, electrical work, factory, workshop or household use. Send postcard for free literature.

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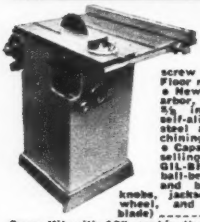

TILT/ARBOR SAW

• 27x28 in. table stays level. Blade tilts full 45 degrees. • 10in. blade cuts 3½ in. deep, jack-screw depth adjustment. • Floor model, 34in. table height. • New Departure ball bearing arbor, ⅝ in. precision shaft, ready to run, ⅝ in. bore blades. • Quick positioning, self-aligning rip fence guide. • Sturdy wood, steel and aluminum construction. • No machining—build easily with hand tools only. • Capacity and performance of floor saws selling for $150.00 and up!

GIL-BILT Metal Parts Kit, includes Plane, ball-bearing arbor, cast aluminum miter gauge and bar, rip fence guide, machined lock knobs, jackscrew mechanism with 4½ in. handwheel, and all other metal parts (less blade) ---------- $20.95

Same Kit with 10" combination blade ---------- 24.90

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If not satisfied, return Kits in 10 days for refund of purchase price.

(Prices include postage up to 600 miles)

GIL-BILT Step-by-Step pictorial plans (No blue-print reading required), full scale patterns, actual photographs for above 10" TILT-ARBOR SAW, 12" BAND SAW, BELT SANDER, 8" TILT/TABLE SAW $1.00 each, postpaid anywhere in the world. ALL 4 Plans for $3.00, or write for FREE descriptive catalog.

COMPLETE PLANS *only* $1.00 EACH

GILLIOM POWER TOOLS P. O. Box 1-RL, Lambert Field, St. Louis 21, Missouri

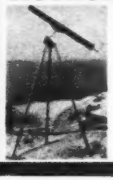
Telescope Maker's Page

[*Continued from page* 155]

Incidentally, we are interested in such wrinkles. How about letting us see some pictures of your ideas in telescope construction?

We have just finished reading with a good deal of fascination, a new book, Introducing the Universe by James C. Hickey. Mr. Hickey, in this book published by Dodd Mead & Co., leads the reader in a step-by-step sequence from the "unwearied sun" to the moon, planets, meteors and comets. Then he transports the earth-bound observer to the awesome Milky Way and its myriad scintillating constellations. The sun, we learned with a feeling of relief, is good for another ten billion years. Variable stars, exploding stars, and double stars and other phenomena are very succinctly explained in non-technical language. The planet Pluto, for example, was discovered without ever having been seen. Its exact location was determined because of the irregularities in the motions of the planets Uranus and Neptune. •

☆ **GIANT** ☆
ASTRONOMICAL TELESCOPE



Ready for use. 6 ft. tripod. 100 diameters magnification. (10,000 area magnification). Extra eyepiece especially suited to observing Milky Way, Nebulae, Comets, Double Stars and Star Clusters. Sun projector lens for watching sun spots. Full power and clear vision guaranteed. $15.00. 25% deposit on C.O.D. orders.

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SUFFOLK SCIENCE SERVICE
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TELESCOPE MAKER

Make your own telescope. Quality supplies guaranteed. Complete 6" kit $5.50 up. Pyrex mirrors made to order. Aluminizing. Prisms—eyepieces—etc. Free catalog. Instructions—10c.

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HIGH POWER TELESCOPES

40 Power—opens to 36 inches. Precision & Polished Lenses. Ideal for Studying Stars, Plane Spotting or Interesting Pleasures. Satisfaction Guaranteed or Money Refunded.

Send Check or Money Order to

CRITERION CO., DEPT. ML7
438 ASYLUM ST. HARTFORD 3, CONN.

$3.49 Postpaid

Sweetest 22 Rifle under any Christmas tree—

GIVE A REMINGTON

Your Christmas gift should be something *special*—a Remington "500 Series" 22! These precision-built rifles are well-balanced, fast-handling, with features that others don't have.

Every Remington "500 Series" 22 has a handsome American walnut stock. The barrels and actions have rich-looking blue-black finish. For extra strength, all of them have *double* cams, *double*-locking lugs. For extra safety, Remington's famous red dot firing indicator that pops out when the rifle is cocked.

Though the price is modest, every Remington "500 Series" 22 is truly *special*—backed by 135 years of gunmaking experience.

WHICH REMINGTON FOR YOU?

Model 512 tubular repeater (pictured). Large magazine capacity.

Model 510 bolt action single shot. Completely automatic safety.

Model 511 box magazine repeater. Magazine holds 6 shots.

Remington DU PONT

Boys!

BUILD A MODEL CAR LIKE THIS—

Win $4,000 FOR A College Career!

THINK OF IT! You can have the thrill of creating your own "dream car" or "car of tomorrow" by building a *scale model* of it, right at home—then enter it in the big Fisher Body Craftsman's Guild Competition and try for one of the many awards to be won!

There are 734 separate awards, worth $65,000—craftsman's tool kits, cash awards up to $150 each, trips to the Craftsman's Guild National Convention with all your expenses paid, and University Scholarships from $1,000 to $4,000.

You don't have to make an operating model, just a solid "mantelpiece model" of balsa, plaster or any easily worked, durable material. Work in your own ideas as to fenders, headlights, trim and so on—then paint it to suit your own taste. The Fisher Body Craftsman's Guild will even send you plans and suggestions to get you started, and show you how to work out your own designs!

One hundred and seven young men like yourself have won Guild scholarships already—10,037 other boys have won awards worth over $493,000! You have a good chance—you'll have great fun—*so send in this coupon today and get started!*

734 AWARDS—WORTH $65,000

8 University Scholarships (choose your own university!) worth $1,000 to $4,000 each. ★ All-Expense Trips to the exciting Guild Convention. ★ Cash Awards—up to $150 each. ★ Model Builders' Tool Chests. ★ *Identical Awards for Junior and Senior groups.* If the son of a General Motors employe wins, his award is duplicated for the next boy.

THE RULES ARE SIMPLE AND EASY

You are eligible to enter the Competition if you live in the United States, and if you were at least 12 but not yet 20 on September 1st, 1951.

You compete against boys in your own age group, with identical awards for each group—Junior Division (boys 12 through 15) and Senior Division (boys 16 through 19).

No entry fee—just build a solid model of a car according to your own ideas of design. Full instructions furnished free.

FISHER BODY CRAFTSMAN'S GUILD
General Motors Building, Detroit 2, Michigan

Please enroll me in the Fisher Body Craftsman's Guild Competition for 1952. Also—send me the Craftsman's button and membership card plus complete instructions for building a model. All this will be sent FREE and without obligation to me.

Name _____

Address _____

City and Zone _____ State _____

I was born on the _____ day of _____ 19____

Parent or guardian _____

Name of my school _____

City _____ State _____

Dept. 3.

New Amazing Wonderful Gem
DIAMOTHYST
Far more brilliant than
DIAMONDS
$24 Per Carat

Harder than zircons, keep their brilliance forever.
Diamothyst is .7 on the *Moh's* scale of hardness, and *diamonds are* .9.

The greatest gem discovery in history, which is the result of experimentation of one of America's largest corporations, brings you *Diamothyst*, a gem with a refractory index higher than, and a dispersion factor greater than a *diamond*. Its refractory index is about 10% higher than *diamonds*. It may seem fantastic to you as it did to us, but now you can have a gem that looks like a *diamond* and is actually far more brilliant than a *diamond*, and even many PAWNBROKERS have mistaken it for a real *diamond*. Yet you can have it at about 1/30 the cost of a genuine diamond. (Buy a Diamothyst instead of a *diamond* and save the difference.)

Only $24 a carat, tax included. The hundreds of dollars thus saved will go far toward buying a home. You need no longer invest large sums of money in a tiny stone, the value of which is determined largely by *scarcity* and *control*. YOU can enjoy the beauty and prestige and the envy of your friends with a stone that only an *expert* working under a *good light* can detect as not being a real *diamond*.

PAWNBROKERS, ATTENTION:

We urgently recommend that you order a sample of this amazing product to have in your shop for comparison with a genuine *diamond*. Many pawnbrokers have paid out money under the impression that they were loaning on diamonds when in reality, the people were offering *Diamothyst*.

COMPARE:

REFRACTORY INDEX OF DIAMOTHYST IS BETWEEN 2.62 and 2.90 as compared to DIAMOND'S 2.42. DISPERSION OF DIAMOTHYST RANGES BETWEEN 0.155 and 0.205 in comparison to the DIAMOND'S 0.025.

MONEY BACK GUARANTEE WITH A 30-DAY TRIAL IN YOUR HOME.

YOU ARE THE SOLE JUDGE

In this advertisement, you are assured, that if you are *dissatisfied* for any reason whatsoever, you may return the Diamothyst for 100% CASH REFUND WITHOUT QUESTION!

You can order them in 1, 2, 3, 4, 5 —up to 10 carats at $24 a carat.

Take the price of the rings shown above in the 1 carat size and add $24 for each additional carat you want. ORDER TODAY, DON'T DELAY!

a. FISHTAIL STYLE with *Diamothyst* gem

1 carat.....$42.00
2 carats.....60.00
3 carats.....90.00
4 carats.....114.00

b. MODERN GYPSY with *Diamothyst* gem

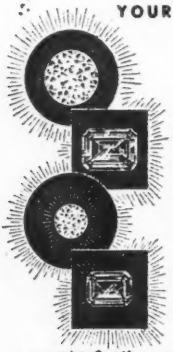
1 carat.....$63.00
2 carats.....89.00
3 carats.....113.00

c. PRINCESS EARRINGS
Please note the illustration here of the new wing-type safety mounting that is so easy to put on and so very comfortable to wear. Please specify in your order if you wish earrings for pierced ears. There is no extra cost. **$84.00 pair**

d. BOX STYLE with *Diamothyst* gem

1 carat..$60.00
2 carats..$1.00
3 carats..100.00

e. GOLD CHAIN AND CROSS with 9 *Diamothyst* gems.....$75.00



A beautiful engagement ring made with a *Diamothyst* presented to any girl will inspire her devotion. You can buy many things with the hundreds of dollars thus saved. Each *Diamothyst* is perfectly cut, with full 58 facets per brilliant stone. Legally we cannot refer to the *Diamothyst* as a *diamond*, so we ask you to order in the 3 most popular *diamond* shapes — namely the round or *BRILLIANT*, the oblong or *EMERALD* and the oval or *MARQUISE* cuts.

You may order these gems for setting by your local, friendly, trustworthy jeweler, who will be glad to verify your purchase, or you can order them in the mountings shown above.

FREE There is no charge for mounting *Diamothysts* in Your Jewelry —they will be mounted absolutely *FREE!*

REGAL GEM CO., Dept. 111, 213 Market St., Newark, New Jersey

Yes! Please rush my selection of DIAMOTHYST gems as I have indicated below. If not delighted, I may return them within 10 days for full refund. My finger size is.....

MOUNTED GEMS:
- ☐ A. 1 Carat Diamothyst Fishtail style set in 14-kt. white gold mounting $42.00
- ☐ B. 1 Carat Modern Gypsy with DIAMOTHYST Gem set in 14-kt. white or yellow gold mounting $63.00
- ☐ C. 1 Carat Princess Earrings $84.00
- ☐ D. 1 Carat Diamothyst set in masculine Box Style white or yellow gold mounting $60.00
- ☐ E. Gold Chain and Cross with 9 Diamothyst Gems $75.00
- ☐ Fishtail with gold chain. 1 carat Diamothyst, only $65.00
  EACH ADDITIONAL CARAT $24. style as shown on model

UNMOUNTED GEMS: ☐ 1 Carat $24.00 ☐ 2 Carat $48.00 ☐ 3 Carat $72.00, etc.
EACH ADDITIONAL CARAT $24.

NOTE: A $5 deposit must accompany each C.O.D. order. All prices tax included.

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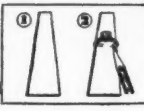
☐ Inclose $5. I will pay postman balance plus postage. *NOTE: If you don't know ring size, send thin strip of paper.* **SENT ON APPROVAL** ☐ I enclose full price, send postage prepaid.



HOW TO MEASURE FINGER SIZE

(1) Cut flat, stiff cardboard into a long, narrow wedge. Take ring that fits and is not bent; (2) Slip it over narrow end of card until it stops—do not force. Draw lines at both sides of ring. Send us the cardboard. Do not send your own ring; nor use string to measure.

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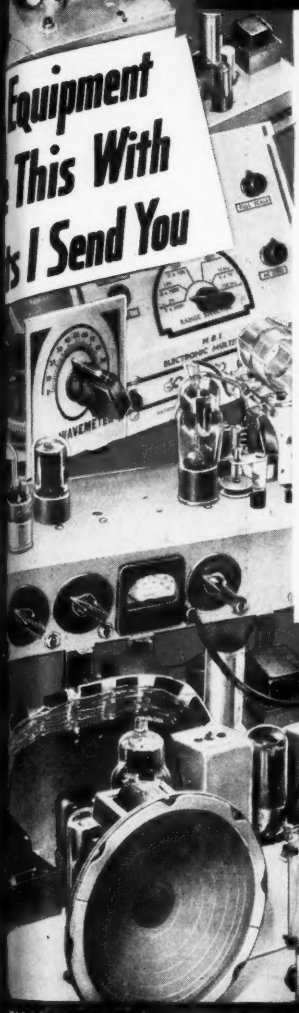

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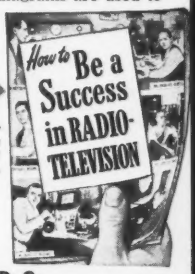

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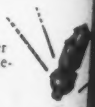

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